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Original Communications.

*THE SPECIAL INFLUENCE OF ALTITUDE UPON HEALTH, DISEASE, AND SANITATION.**

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In what material respect does a high climate, such as that of Colorado, differ from the low climates of the more eastern States? To answer this question as satisfactorily as the limitations of our present knowledge will allow, we must briefly recall the known physical and physiological facts in the case, glance at recent experiments, give a summary of clinical experience, draw logical deductions from these facts and corroborated experiences; and then consider how health, disease and sanitation are modified by altitude.

Looking first at the physical facts, we find there is one element only, but a most important one, which a high climate possesses and a low one does not—viz., diminished barometric pressure. While possessing also in an unusual degree and combination abundance of sunshine and pure, cool, dry air, it shares these more or less with other climates. Much speculation and various theories have been indulged in to explain the effects of reduced barometric pressure. When I first came to

*Read at the meeting of the American Public Health Association, held in Denver, October, 1895.

live in Colorado Springs, now some twenty-one years since, the solution to the problem was clouded by wrong conclusions drawn by the great traveler and scientist, Von Humboldt. Since then the physiologists have been at work and have given us a sure foundation upon which to lay in their proper order the facts gathered from observation.

With diminished barometric pressure we have of course less weight of atmosphere pressing upon the surface of the body, and this was for a long time thought to be important in accounting for the phenomena. It has since been shown, however, that as the pressure from the air within the body is equally diminished, and the laws regulating the diffusion of gases equalize the pressure throughout the body, there is no direct practical effect from diminished barometric pressure *per se*. Then, because with the lessened amount of air to each square inch of atmosphere there must also be a diminished amount of oxygen, the conclusion was wrongly drawn that it was the scarcity of oxygen which accounted for the shortness of breath, etc., and the other phenomena of mountain-sickness.

As the actual amount of oxygen, even at the greatest heights to which man has climbed, is always in excess of that needed for the blood to carry on its functions normally, this does not give the answer, which has at last been found to be, not lack of sufficient oxygen, but a low proportion of oxygen in each cubic foot of air inhaled. In short, the special effects of altitude are directly produced, neither by the reduced pressure of the atmosphere nor by the reduced amount of oxygen affecting the lungs and heart, but by *the reduction of oxygen-pressure*. When air is inhaled into the lungs, a certain proportion of the total amount of oxygen contained in this air is absorbed by the hemoglobin, which is that element of the blood that is contained in the red corpuscles and is the direct carrier of oxygen to the system. As each drop of hemoglobin can only take up oxygen in a certain proportion to the oxygen-pressure of the air, when the oxygen-pressure is lowered (as it is in elevated climates) discomfort ensues to the visitor because his blood is not sufficiently oxygenated at each ordinary breath. To remedy this he breathes faster, so as to get in more air and so more oxygen in a given space of time, and the heart has therefore to pump blood more frequently into the lungs, and his pulse beats faster. Such are the temporary remedies; but in time the chest becomes expanded so that more air is taken in at each breath, and the heart is stretched so that its cavities hold more blood, and its walls are thickened so that the muscle has more force to pump this increased amount of blood.

Nature's method of compensating for this deficiency does not stop here, however; a still more remarkable change takes place, in which lies the special therapeutic value of high climates for appropriate cases. This change is an increase in the amount of red corpuscles and hemoglobin, whereby the oxygen-absorbing power of the blood is largely increased, and in a definite ratio to the elevation. Some of the experiments which have established these facts will be briefly referred to.

Paul Bert, on examining the blood of the llama (the Peruvian mountain sheep), found that for every 100 Cc. of blood it absorbed an average of 20 Cc. of oxygen, while the sheep of the plains did not absorb more than an average of 15 Cc. for the same amount of blood. Viault, Muntz and others in various ways repeated and confirmed these experiments. That the increase in the number of red corpuscles and hemoglobin is due to the diminished atmospheric pressure, and not to the other accompanying conditions, was proved by Regnard, who at sea-level placed a rabbit under a bell-glass and reduced the atmospheric pressure until it was equivalent to an altitude of 9500 feet. Two bell-glasses were used together, so that the rabbit could be changed from one to the other when cleaning and disinfecting was required. The rabbit was kept in this atmosphere for a month, and then came out fat and healthy. The examination of its blood showed that it absorbed 21 Cc. of oxygen, while under normal conditions its blood and that of its fellows at sea-level could only absorb 17 Cc. These changes in the respiratory capacity were not completed under a month.

At the congress "Für Innere Medicin," held at Wiesbaden in April, 1893, Dr. Egger read a valuable paper upon "The Blood-changes in High Mountains." He begins by referring to the experiments of Viault, made at Merococha, Peru (altitude 14,275 feet), upon six persons, in which he found that after they had ascended from sea-level and remained three weeks the number of red corpuscles had increased from 5,000,000 to 8,000,000. He then passes on to detail his own experiments made at Arosa, altitude 5500 feet, during the summer of 1891, upon twenty-seven persons—twenty-one men and six women. In all there was a marked in-

crease of blood-corpuscles, the average increase being sixteen per cent., and it was greater among the tuberculous than among the sound persons. The diet and other conditions were kept the same. Like experiments upon nine rabbits showed seventeen per cent. increase. The increase was permanent, as the blood was retested in several cases some months later; and further, the blood of ten natives showed the same average in number of red corpuscles, viz., 7,000,000. Experiments upon six rabbits also demonstrated the fact that the increase was not in the capillaries or cutaneous vessels alone, but universal, being found in the carotid and femoral arteries.

He proves further that the increase was not due to the drier air of the high ground evaporating the serum and so increasing the blood density and therefore merely increasing the relative number of corpuscles, but was an actual increase. This was done by withdrawing blood from two rabbits on low ground, at Basle, treating it with the hematocrit, and then three weeks later doing the same experiment upon the same rabbits after transferring them to the high ground of Arosa. He thus found that the percentage of solid constituents in the blood examined was practically the same on high as on low ground. In five persons resident in Basle—three men and two women—who were suffering from marked oligocythemia (*i. e.*, scarcity of red corpuscles), there was after a few weeks' change to Arosa an increase from 5,000,000 to 6,000,000, and their disease was cured. He found also in healthy persons who returned from Arosa to low ground that the number of red corpuscles became normal again in three weeks, while with the anemic the increase would fall to normal but not below.

He also made experiments for hemoglobin, using Fleischl's hemoglobinometer, modified somewhat by Miescher. In eleven persons, a month after their transference to Arosa from sea-level, he found without exception 16.35 per cent. increase of hemoglobin, and the same was shown in three rabbits. He noted, however, that the hemoglobin was increased much more slowly than the corpuscles, and as this is exactly what takes place after a hemorrhage, when there is a rapid increase of red corpuscles followed by a gradual increase of hemoglobin, he argues that this is an additional proof that altitude increases the actual amount of both corpuscles and hemoglobin and is no mere relative or apparent increase.

Muntz, by experiments upon rabbits at sea-level on the Pic du Midi (9000 feet), found that the specific gravity of the blood was increased by altitude, as was also the amount of iron. Viault in 1890 made similar confirmatory experiments upon the Pic du Midi.

Egger, in closing, said that the one important factor in the causation of these changes is the diminished oxygen-pressure, and that the crucial experiment was made by Regnard, when he proved that when barometric pressure was decreased the blood's power of absorption of oxygen was increased.

At the same congress Drs. Koeppe and Wolf also reported upon the blood-changes produced by altitude. Their experiments were made between Leipzig, near sea-level, and Reiboldsgrün, elevation 2200 feet. They found by experiments upon healthy and sick persons, and especially among the latter, upon transference from the low to the high ground, a marked increase in the number of red corpuscles, a marked reduction of hemoglobin, a striking behavior in the proportion of blood-plates and a unique appearance of them; these changes remaining constant after the eighth or ninth day. By comparison with other observers at different altitudes, it was found that the number of corpuscles increased with the altitude; that the new corpuscles were smaller in size than the old, and not as rich in hemoglobin. These facts seemed to confirm the belief that altitude increases tissue-change and is therefore of special value to consumptives.

Egger found that during the first twelve days of residence on high ground, while the corpuscles increased 19.72 per cent., the hemoglobin increased only 7.23 per cent. But in the next twenty-four days, while the corpuscles increased only four per cent. more, the hemoglobin was increased eight per cent. As Koeppe's cases were only observed an average of fourteen days, while Egger's were observed for an average of thirty-six days, the evident error of Koeppe in stating that the hemoglobin was not increased is partially explained. His observations were not as elaborate or as precise as those of Egger, and with respect to the increase of hemoglobin are opposed to all other observers and conflict with reasonable deduction.

We see, then, that the following facts are established, namely: that the peculiar effects of high climates are, to increase the amount of red corpuscles and hemoglobin in the blood, as well as its power of oxygen-absorption; to increase the chest-expansion—a fact

which is admitted by all observers, who also have remarked frequently upon the almost emphysematous character of the breathing, especially at the apices of the lungs, of the native-born children and old residents.

With regard to the assumed enlargement of the heart cavities and muscle, no sufficiently precise or extensive experiments have been as yet made to prove what logical deduction and common belief endorse, viz., physiological cardiac hypertrophy. The remarkable power of horses raised in high climates to endure prolonged fatigue and great speed, both in their native uplands and also when transferred to the sea-level, is a matter of common observation and belief. In men the superior endurance of mountaineers is also well known. This has been noted especially by Hirsch in accounting for the endurance of the natives resident in the high Andes. Further, the results of the treatment of heart disease by the strengthening effect of climbing and high climates, as recommended by Oertel, tend to confirm the belief that the heart is increased both in strength and capacity by altitude.

We have, then, as the special physiological effects of altitude, acting through the diminished barometic pressure, greater lung capacity, as shown by the increased chest-expansion and more forcible breath-sounds, a stronger and larger heart, and an increased ability of the blood to absorb oxygen. Therefore we have good reason to believe that there is developed a greater power of resistance to the attempted lodgment of germs within the body, by means of the increased germicidal character of the more highly oxygenated blood, and through the more perfect working of the heart and lungs. We may also assume that there is an equalizing of the circulation throughout the body, and the tendency to local stagnation—that is, to chronic congestion — is thereby lessened. On the other hand, the more vigorous circulation would, if by any accident it should be dammed up at any point, cause a more violent local inflammation and a greater general fever and disturbance. This is shown in acute pneumonia, a disease more severe on high ground than at sea-level under otherwise like conditions.

Along with these effects of altitude upon the composition and circulation of the blood and upon the respiration, certain peculiar effects upon the nervous system have been noted; but as this field has not as yet been fully worked, and does not affect the main points of the discussion, I shall pass it by for the present, merely remarking that the influence of altitude is largely modified by it.

Turning now briefly to consider how the results of observations on the effects of altitude upon disease agree with the physiological facts proved and inferred, we find that better results as a rule are obtained in high than in low climates upon all diseases where anemia or any other deficiency of the blood is the most important factor in the sickness, and also in chronic germ diseases such as tuberculosis — provided, of course, that in either case some of the accompanying conditions are not of a nature to be seriously aggravated by altitude.

So that it is true that cases of pure anemia, or those in which the anemia is the controlling factor, as in most cases of neurasthenia, and cases of pure tuberculosis or mixed tuberculosis without grave complication from catarrhal, inflammatory, or irritable nervous or cardiac conditions, are as a rule most markedly benefited by residence in a high climate, as indeed might be expected from the equalization of the circulation referred to. The tendency to hemorrhage is lessened, but when it occurs the bleeding is often more profuse. Many chronic heart affections and aneurisms are benefited; while, on the other hand, in such cases where the disease is too far advanced to admit of improvement, there is great danger in high climates.

Returning to the question of the assumed increase of the germicidal power of the blood: though the physiologists have not as yet proved it by experiments, as they probably will when they have time to devote to the subject, certain clinical observations strengthen a belief in its existence. As an instance, such fevers as typhoid, scarlet fever, measles, etc., occurring in high climates, are much more frequently of a mild type than corresponding cases in low climates—often, indeed, so slight in symptoms as to pass unrecognized, showing doubtless that the germs are scanty and well resisted. Alongside of these mild cases, however, every now and again are seen some of the most severe types—apparently indicating that when the attack has come from an unusual quantity of germs, even the specially strong germicidal power of the blood is overthrown, and the disease progresses uncontrolled. This at least occurs in the outset, though if death does not ensue the increased power of resistance returns and the convalescence is more rapid and complete than it

probably would have been at sea-level. This increased germicidal quality of the blood is shown, I believe, in many ways; for instance, the comparative difficulty in making successful vaccinations in high climates, and the rarity of hydrophobia, are probably additional proofs.

Before closing I will briefly refer to the effect produced by some of the elements of elevated climates, other than diminished barometric pressure, which they share in common with certain of the low climates. While there may, or may not, be more or less precipitation, there is almost invariably drier air, as shown by less humidity both relative and absolute, and usually a dry, well drained soil. The quality of dryness lessens the effect of temperature upon the body by producing more evaporation from the skin and lungs, and consequently affections like sunstrokes are rare. In nervous disorders, while neuralgia with anemia is not common, the various myalgias and dry pleurisies are frequent; also inflammatory and irritable conditions, and disturbances of nervous equilibrium, are not rare. As might be expected, the dryness improves the action of the skin, mucous membranes, bowels, liver, etc., in one class of individuals, while it disturbs it in another. The dry air further increases the nerve-tension of the individual and also the electric phenomena of the atmosphere.

In summer, warm, dry air, by provoking evaporation lessens the injurious effect of heat upon the body; in cold weather, on the other hand, cold dry air being a non-conductor, the cold, while it chills the surface, does not penetrate to the interior of the body.

Dry air, again, interposing but little vapor between the body and the sun, allows the latter to shine with greater heat and light than in most low climates, and therefore the vivifying effects upon animal life are strongly exhibited; while the air itself, being usually cold in the shade and at night, there being but little vapor in it to retain the heat, mitigates the injurious influence of over-heat.

The increased sunlight and sun-heat, with the increased electric tension, and consequent increased ozone, insure a normally pure air, and a more ready destruction of germs when they are conveyed into it from the bodies of sick persons or animals, or from garbage or filth; so that it is found that the tubercle bacilli in sputum are more quickly destroyed and infection more rarely follows even when the conditions are otherwise favorable for its occurrence. On the other hand, out of the body as in it, if for some reason the number of germs is excessive, the barriers put up by altitude are swept away, and infection will be as sure and fatal as in low countries; so that while it is reasonable to believe from the facts and logical assumptions that at a high altitude both the body and the air are better protected against injurious germs, and that these germs are feebler and less abundant, yet when the safety line is once passed the pestilence will walk and the body wither as surely on the mountain as on the plain. Thus, while the mountaineer may trifle longer with the laws of health and sanitation than the plainsman, yet if he does not mend his ways the day of reckoning will surely come.

In climates high or low the laws of health must be obeyed. To preserve the body in a state of resistance, and to keep the house sanitary, both must be clean, and pure air and sunshine be supplied to them; with this accomplished, no other germicides are needed, nor will infection be rife. Apropos of ventilation and sunlight as against disinfection, this story of the coarse but brilliant Abernethy may be quoted: On being asked what he thought of disinfectants, which in his day were of the loud-smelling order, he replied: "They are a good thing, a damned good thing, because they kick up such an infernal stink that you have to open the windows."

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*THE AFTER-TREATMENT OF NORMAL CATARACT EXTRACTION.**

By Casey A. Wood, M.D.,
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Although one commonly thinks of cataract as an opacity of the crystalline occurring in an eye otherwise normal, it is nevertheless incorrect to regard the ocular structures surrounding the diseased lens as being themselves unaffected. A cataractous eye is not an *oculus sanus in orbita sana.*

There is a sense, however, in which the healing process pursued by the wounds involved in the extraction of cataract may be described as normal. At any rate the subsequent course followed by the process of repair, the visual results, and the ultimate fate of the eye, are usually determined at the time of the operation. Fortunately the cases in which the final result is in every sense of the word

*A lecture delivered at the Post-Graduate Medical School, Chicago.

good, where the normal healing process is not interrupted, and useful vision is obtained, are in the majority; but that the proportion of these can be still further increased by strict attention to the details of after-treatment, is my firm conviction.

After the removal of senile cataract (if the operation be performed without iridectomy) the pupil should remain round, small, and central. It matters not what plan of extraction be followed, there should be no presentation of vitreous or iris between the lips of the corneal or scleral wound; there should be no undue loss of blood from, or continuous bleeding into, the anterior chamber—which should itself be free of lenticular or capsular detritus. The wound-edges should be neatly and closely applied to each other, and no extraneous matter—such as blood-clots, iridic, capsular, or lenticular debris—should be permitted to remain between them; there should be no collapse or wrinkling of the cornea, and no eversion of the wound-margin. The patient should be able to count fingers and to tell time by the watch.

Assuming the operation to have been correctly performed, and that there are no complications, the question at once arises as to the advisability of washing out the anterior chamber for the purpose of expelling any remnants of blood, cortical matter or capsular tissue that have not been previously extracted. Although my own experience and that of older operators is opposed to this method, there are still ophthalmologists of repute who advise it. If resorted to at all, the greatest care and gentleness should be exercised. Panas—who, by the way, has recently abandoned the method which he was among the first to advocate—advised the use of a specially devised syringe (Fig. 1), the point of which is to be introduced between the lips of the wound, and the anterior chamber flushed with one of the following solutions, all of which are to be *warm:*

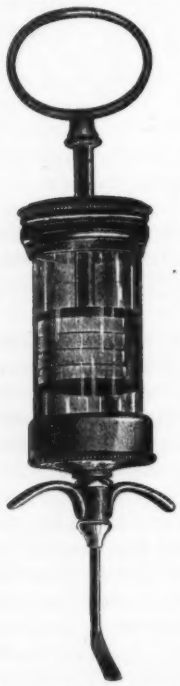


FIG. 1.

Borax, 4 Gm.;
Boric acid, 3.5 Gm.;
Hot sterile water, 100 Gm.

Or,

Common salt, 1 Gm.;
Sterilized warm water, 100 Gm.

Where an *antiseptic* is for any reason desired almost any of the well tried germicides may be used, but it must be remembered that a very lively reaction sometimes sets in even after the employment of the simplest irrigating liquid. For example:

Mercuric iodide, 0.01 Gm.;
Alcohol (better omitted), 30 Gm.;
Sterile water, 200 Gm.
Shake well, and filter.

A less irritating mixture (also used warm) is:

Formol (formalin), 0.01 Gm.;
Water, 50 Gm.

Or,

Boric acid, 3.5 Gm.;
Hydrarg. bichlor., 0.01 Gm.;
Water, 100 Gm.

All sorts of instruments besides Panas' syringe have been devised for the purpose of irrigating the anterior chamber. (See Fig. 2).

FIG. 2.

Instead of using the syringe piston or bulb as the propelling force, I have been in the habit of flushing with the following apparatus: A pint bottle filled with the warmed irrigating fluid, and provided with a nozzle and stopcock at its bottom, is placed about four inches above the patient's head. Rubber tubing connects the bottle with the point of a Bowman's syringe. After the whole apparatus has been carefully sterilized, the syringe-point is placed within one angle of the operation wound, and the chamber is washed out by a stream from the bottle. The process is repeated at the outer wound-angle until the pupil becomes black and the chamber clear.

Whether we wash out the anterior chamber or not, a simple, but at this stage of the operation exceedingly useful, procedure is the removal, by means of a spoon, spatula, iris repositor, or similar instrument, of all the foreign bodies from the wound-angles and along the line of the sclero-corneal incision. For this purpose I prefer and often use the

instrument devised by Beltman (Fig. 3) for the maturation of unripe cataract. The point of the instrument is entered at one angle of the wound and carried to the opposite side.

FIG. 3 (reduced one-half).

We ought to repeat this manœuvre, if necessary, to allow of close apposition of the wound-edges.

The whole length of the incision should now be closely examined with a lens for the purpose of detecting and removing any lenticular shreds, pieces of capsule, iridic pigment, vitreous beads, or minute blood-clots, that have escaped the earlier inspection. When even very small tissue shreds are allowed to heal in the wound, they are prone to attach themselves also to the iris, to the posterior capsule, or to floating bodies left in the anterior chamber, and so greatly mar the final result. Not only that, but they establish a communication between the interior of the eye and the outside world, and thus sooner or later become the means of infecting the delicate parts within.

Knapp and others have warned us of the danger which attaches to massage of the cornea with the finger and lid-edges in attempts to remove any of the anterior-chamber contents. The free borders of the lids are the parts of the external ocular apparatus most difficult to sterilize and most crowded with pathogenic microbes. It has again and again been demonstrated bacteriologically that the palpebral edges remain infected long after the surrounding skin has been rendered fairly sterile. The cilia perform for the conjunctiva much the same office that the vibrissæ do for the nasal mucosa, and the number and variety of bacterial colonies planted upon the free borders of the alæ nasi closely resemble those which we find infesting the skin about the eyelashes. Consequently, to rub, ever so lightly, the free edge of the lid over the freshly made wound in the cornea, is to invite infection of the latter.

The apparatus for flushing the anterior chamber just described (or some modification of it) may well be used for washing away foreign matter from the eyeball, sac, and lid-edges, before the final toilet is made. Instead of the syringe-point, a sterilized pipette or the glass end of a medicine-dropper may be employed. I have used for this purpose a warm one-per-cent. solution of common salt, and prefer it to the elaborately prepared antiseptics employed by some operators. As it is about as difficult to sterilize the conjunctival sac as it is to sterilize the lid-eges before operation, it may be accepted as truth that we cannot render it completely aseptic in the short time at our disposal after the removal of the lens.

Panas is of opinion that the nearest approach to sterility of the lid-edges that we can make is effected by the application (with a probe) to them of an oily solution of mercuric iodide. He advises its employment (and the use of occlusive bandages) for from twelve to twenty-four hours previous to the operation. If used *after* the extraction it is to be applied to the free borders and palpebral skin. The formula is as follows:

> Mercuric iodide, 0.01 Gm.;
> Sterilized almond or olive oil, 40 Gm.

Then the dressing. I have never seen any good result from the use of remedies applied directly to the eye in the form of powder. I have used finely pulverized boric acid dusted upon the lids and lid-edges, and believe its action, when it had any at all, to have been entirely harmful. Still more am I opposed to "packing" the eye with that most objectionable of all applications used in ophthalmic surgery—iodoform.

Both these powders are likely to find their way between the lids to the eyeball, and, however finely divided, are almost certain to act as foreign bodies and to irritate the eye. They are at best but feeble antiseptics, while, in my opinion, iodoform should only be used when the patient is affected with a kindly anosmia.

If it be desired to affect the eye with drugs of any sort, now is the time to use them. It was once almost the universal custom to instill a one-per-cent. solution of eserine, when the simple operation was chosen, for the obvious purpose of contracting the pupil and so preventing prolapse of the iris. But as neither mydriatics nor myotics have any appreciable effect upon the muscular fibres of the iris so long as the anterior chamber is empty, this procedure has been pretty generally abandoned. This objection also holds true in respect to atropine, a useful agent in preventing adhesion of the iris to floating debris in the anterior chamber, and in incipient iritis. A decided mydriasis may, however, result from an instillation of atropine, even two or three days before the anterior

chamber has re-formed, just as soon as it is again refilled. If applied at all, I am much in favor of employing these remedies in the form of ointment, smeared on the lids or on the dressing. Not only is a drug applied in this shape more uniform in its action, but it is decidedly more persistent than when exhibited in solution. Moreover, one also obtains the soothing effects of the greasy application to the lid-edges, preventing their adhesion if much mucus is formed beneath the dressing, and allowing a ready escape for tears and other discharges.

We now come to the question of the dressings themselves. And first of all, shall we apply them to one or both eyes? Personally, I have never been able to see any reason for covering the sound eye after a normal cataract extraction. It has a very depressing effect upon most patients, it does not prevent them from moving the eye underneath the bandage, and it does not in any way assist the healing process in the eye operated upon.

As to the form of the dressing, there is about the same difference of opinion to-day that existed in the time of Von Graefe and Beer; one school cries out for heavy bandages and absolute rest, the other for liberty and no dressing. One extremist applies to both ocular regions a thick flannel or gauze bandage over pads of borated or even iodoform cotton (Fig. 5), while the enthusiast of the protestant creed advocates a narrow strip of isinglass or other plaster (Fig. 6), just large enough to keep the lids together. Doubtless each one of us considers his method to be the best, but even a superficial study of the course pursued by the healing process after cataract-extraction will show that the great majority of cases do well with any kind of bandages or with none at all, and I am therefore inclined to the one that gives most comfort to the patient. I do not think we should arbitrarily use any form of dressing in *all* cases. I usually prefer the following (Fig. 7): A layer of borated or sterilized cotton, two or three millimeters in thickness, is applied to the surface of two single layers of sterilized gauze. These are together cut out (so that they adhere and form one piece) with a pair of scissors, in oval form and of a size to cover the orbital openings, reaching from the eyebrows to below the inferior orbital margin. Three pieces of adhesive plaster, each three or four inches long, keep this dressing in place and are so arranged that no portion of them presses upon the eyeball. This is accomplished by placing the first over the upper border of the pad, and firmly attaching both to the skin above the *superciliary ridge;* the second is carried along parallel with the nose; the third completes the triangle. Such a bandage is not too thick and heavy, permits ventilation, does not (while filtering the air passing through it) press upon the eyeball, readily absorbs mucus, and cannot without discomfort to the patient be removed by his friends, or, as the Germans would say, "*respective* enemies."

The patient should be carefully carried or wheeled from the operating-table and placed in or upon his bed. Complete rest for the next twenty-four hours is now in order. He should be warned not to talk more than is absolutely necessary, not to make any sudden movement of his body, and to refrain absolutely from blowing his nose, squeezing his lids together, turning over or getting up suddenly, and above all to abstain from sneezing or coughing. The last two acts are of course largely involuntary, but the patient should be encouraged to suppress them as much as possible.

The room should be made as comfortable as possible for the patient, especially in the matters of warmth, light, and ventilation. Either before the operation or immediately after it he ought to have a full dose of potassic bromide or be given a small quantity of morphia and atropia hypodermatically. I exhibit the former if the patient is of a costive habit, and my formula is usually this:

> Potassic bromide, 2 Gm.;
> Chloral hydrate, 1 Gm.;
> Syrup of lactucaria, 10 Gm.;
> Water, 20 Gm.

This relieves the smarting and burning that almost always follow the operation, and enables the patient to rest quietly and contentedly. It also induces sleep the first night, and puts the bowels in a quiescent condition for forty-eight hours. The diet should be semi-fluid aud easy of digestion.

What can be more provoking to the surgeon than to find, after obtaining a good operative result, that a careless nurse or a restless patient has added a newly opened corneal wound, a hernia of the iris, or loss of vitreous, to his other anxieties? A finger-thrust, a pillow-end jammed into the eye, a slight blow upon the globe, or any other of the dozen little accidents that happen to a person with imperfect vision moving about in darkened rooms, may nullify the most brilliant and correct efforts of the operator.

Especially when night comes on, or when

FIG. 4.

FIG. 5.

FIG. 6.

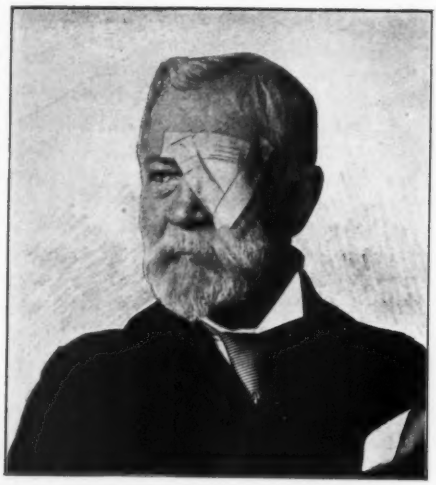


FIG. 7.

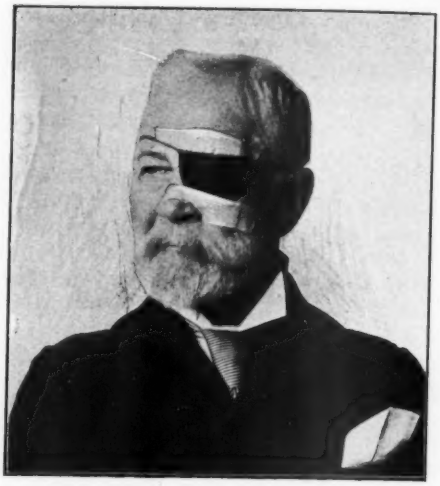


FIG. 8.

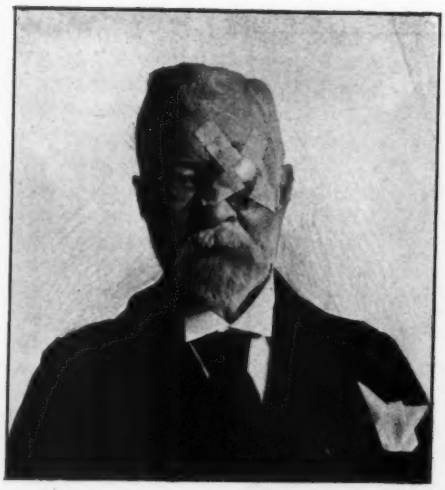


FIG. 9.

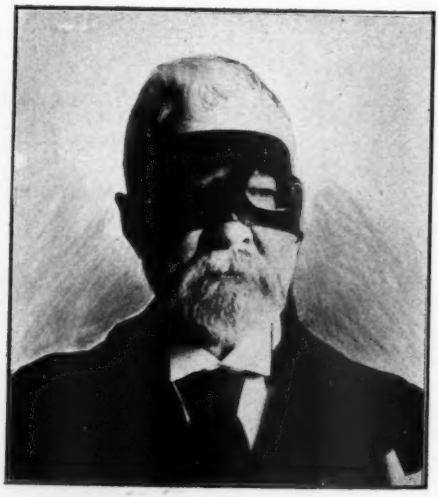


FIG. 10.

the patient begins to move about, the eye should be protected from injury by some sort of a shield or mask. Fuchs uses the wire-woven protector pictured in Fig. 11, and introduced as long ago as 1883. There are many modifications of this mask in the market, one of the best of which has been suggested by Würdemann. (See Fig. 4.)

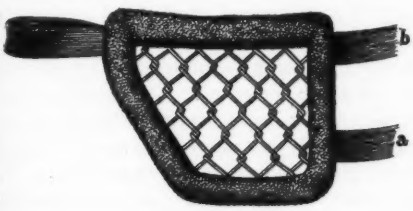


FIG. 11.

Certain operators who make use of the roller bandage gain protection by starching the dressing. When this has dried, the eye will receive a considerable blow without injury.

Snellen has lately used a turtle-shaped aluminium shield (Fig. 9), about ten centimeters long and five wide, placed over the eye and held in position with strips of adhesive plaster; it forms an admirable protector. One of the best shields I am acquainted with is the *papier maché* half-mask (Fig. 10), which when carefully adjusted to the nose and surrounding parts makes a light, comfortable and effective protector.

A small proportion of patients object to wearing any sort of mask, claiming that it prevents them from sleeping and makes them nervous. In such cases I find that one may very well get along with a large, stiff and very concave eye-shade placed over the dressing and held in place with a piece of rubber plaster (Fig. 8).

I am in favor of always removing the bandage and looking at the eye twenty-four hours after the extraction. The corneal wound is now either altogether healed over, especially if a conjunctival flap has been made, or if not the danger of prolapse of the iris has generally passed. That is to say, if no iridic hernia has occurred at the end of twenty-four hours, it is not likely to occur at all from any cause, except from violent sneezing, coughing, direct traumatism, etc. In cases of uncomplicated cataract-removal the lids at the end of twenty-four hours are not discolored or edematous. From a glance at them, one can generally predict the condition of the eye beneath. The discharge on the bandage should be watery only (or contain little mucus) and ought not to be copious. The main object, however, of the inspection is to determine the position of the iris. If prolapse has occurred, *now* is the best time to deal with it.

The eye should be gently bathed with boric-acid solution, and any mucus, vaselin or ointment washed off the lids and cilia. This should be daily repeated. Solutions instilled into the eye must be neutral or slightly alkaline to test-paper, and always warmed.

When the corneal wound is healed and the anterior chamber re-established, the ordinary bandage may be dispensed with. I am in the habit of substituting for it a *concave* monocular eye-shade which, while touching the brow, cheek, and nose, is clear of the eyelashes. This is worn loosely over the eye during the day, and at night is kept in place by a small strip of adhesive plaster, as in Fig. 8. In a week or ten days one may usually dispense with any dressing or protection whatever, particularly where the patient remains indoors.

On what day should the patient be allowed out of bed? In all ordinary cases twenty-four hours is long enough for him to maintain absolute rest. Still avoiding sudden movements he may then be allowed to sit up in an arm-chair and even to move about in the room, and so gradually regain his wonted liberty. After forty-eight hours the bowels should be moved by an enema, and more solid food is to be added to the diet list.

Common sense will dictate when and under what circumstances the subject of cataract-extraction should be allowed to venture out of doors. If exercise be taken in a close carriage, he may, with the eye wearing an ordinary shade, be allowed out, even in severe weather, as early as the end of the second week; when the day is comfortably warm and there is no wind blowing, walks may be taken with impunity.

There should be absolutely no use of the eyes for a month, when glasses should be allowed for distance; when the patient is accustomed to these, lenses for near work may be prescribed.

ANTI-DIPHTHERITIC SERUM AND LOEFFLER'S SOLUTION, WITH A REPORT OF TWENTY-SIX CASES.

By Burt Russell Shurly, B.S., M.D.,
House Physician to Harper Hospital, Detroit, Mich.

It is a well recognized fact that diphtheria is the most fatal and treacherous of the contagious diseases. Within the past nine months 675 cases have been reported in this city, with

a mortality of 175, or 25.9 per cent. During the same space of time sixty-one of these cases have been under treatment at Harper Hospital, with a death-rate of eight, or 13.1 per cent. Diphtheria has a hospital mortality throughout the world of twenty to seventy-five per cent., being twenty per cent. greater than the death-rate from smallpox among the unprotected. In view of these facts, corroborated by general statistics, we are able to show a reduction in the percentage of mortality over previous hospital records, and we report in detail our methods of treatment from the time the patient is admitted until he is discharged. We shall lay aside all pathological and theoretical considerations and endeavor to demonstrate the results of clinical study and observation.

Before patients are received in the contagious wards at Harper Hospital the ambulance surgeon takes a detailed history of the symptoms. In some cases the facts cannot be elicited, through lack of sufficient observation on the part of friends or relatives, but when possible we thus obtain a continuous record of the case.

On admission the patient is isolated at once, the pulse and temperature recorded, blood-serum cultures from the exudate taken, and a thorough examination of the throat made. The clinical symptoms of the case are now noted in detail. Special observations are made and recorded on the character of the exudate, and the various so-called tests applied. The culture tubes are removed to the incubator in our own laboratory, and a culture sent to the bacteriological department of Parke, Davis & Co. for supplemental verification. The patient is now taken in charge by the head nurse; the clothes removed to the disinfecting-room; the patient wrapped in heavy blankets, and a sponge bath immediately given.

Meanwhile the regular hospital treatment is ordered, together with any additional medication the symptoms may indicate. This consists in the first place in a careful systematic dietary, for the most part of milk, together with liquid beef peptonoids, Mosquera's beef-jelly, broths, soups, gruels, egg-noggs, etc. These are alternated every two hours, according to the taste of the patient, and additions are made as may be necessary.

Along the line of therapy we have endeavored to follow the most modern methods of treatment and to combat the progressive character of the disease from the local and systemic standpoints. After eight years of careful investigation and experimental study by the hospital staff in the therapy of these cases, during which time we have run the gamut of pharmacopœial preparations, the combined hospital treatment is generally accepted by the local physicians as highly satisfactory in its results, and I cannot too strongly express my confidence in its efficacy and favorable influence. The anti-diphtheritic serum has demonstrated remarkable results, especially in cases of laryngeal stenosis requiring intubation and tracheotomy.

Medication.—In the use of anti-diphtheritic serum the neglect of local disinfectants is not justifiable, as our first indication in treatment is to prevent or limit the growth of bacteria in the throat. The regular hospital treatment includes first the application of Loeffler's Solution, manufactured by Parke, Davis & Co., according to the formula of the celebrated Dr. Loeffler. It contains:

Menthol, 10 grammes;
Toluene, q. s. ad 36 Cc.;

Then add:

Creolin, 2 Cc.;
Solution chloride of iron, 4 Cc.;
Alcohol, q. s. ad 100 Cc.

A small piece of absorbent cotton is neatly wrapped around a long wire applicator and saturated with the solution. The pledget is then firmly pressed against the exudate for ten to twenty seconds. This procedure is repeated at intervals of three or four hours, night and day. Each application is followed in twenty minutes by irrigation of the throat and nose with our mixture, containing:

Peroxide of hydrogen, 1 part;
Listerine or Euthymol, 1 part;
Dobell's Solution, or aqua calcis, 3 to 5 parts.

The thorough irrigation of the mucous membrane in this manner is of the greatest importance, affording a practical method of antiseptic treatment which limits the local development of the bacteria and secondarily the absorption of the toxalbumins, with the concomitant constitutional effects. This we have made of the first importance in connection with the treatment of this disease, and in seventy-three consecutive cases (mild epidemic) treated by these local antiseptics we had four deaths only, one case being moribund at the time of admission.

We next direct our therapy toward combating and neutralizing the absorption products of the toxalbumins. Where the disease is attended by swelling and edema of the lymphatic glands of the neck we endeavor to control the inflammation by the use of an

ice-bag or ice-collar. Strychnine, quinine and spiritus frumenti are administered in large doses to meet the indications of constitutional disturbance.

On admission to the hospital all well marked or moderately severe cases are given an hypodermic injection containing 10 Cc. anti-diphtheritic serum No. 1 (1500 or 1000 immunizing units, Behring's standard), prepared in the bacteriological laboratory of Parke, Davis & Co. It is with the greatest confidence that we administer this remedy in the early stages of the disease. The skin and the hypodermic syringe being first made aseptic by the use of a five-per-cent. carbolic-acid solution, followed by sterilized water, the antitoxin is slowly injected into the subcutaneous tissue of the buttocks, back, or abdomen. Observations are made hourly on the temperature, pulse, respiration, and the character of the exudate. Cases not showing marked improvement, and those of a laryngeal type, are given a second dose of 10 Cc. six to twelve hours later. Observations are now recorded as before, and the same dose of 1000 units repeated, followed by a fourth in twelve hours, according to the indications. Every case should be treated as early as possible. We never postpone the treatment for bacteriological verification, as we believe the most valuable time is often lost in this way. The great value of the remedy seems to be manifested by using it in sufficient quantity. Our results show no deleterious effects when pushing the antitoxin to three or four, or even five inoculations, but on the other hand we find a positive limitation in the progressive character of the exudate, as well as marked decrease in the amount of systemic infection.

With this general outline of treatment as carried out in Harper Hospital, I present a report of twenty-six cases there treated, showing results and conclusions which I trust will aid in the demonstration of the power and specific influence of serum treatment in cases of diphtheria:

Case I.—L. L., female, age seventeen years; admitted to Harper Hospital at 5 P.M. March 29; temperature 101.2°, pulse 92. Had been complaining of malaise, headache, fever, dysphagia, and anorexia, for twenty-four hours. On examination, tonsils, pillars of the fauces, uvula, and posterior wall of the pharynx, were found covered with a thick, grayish exudate, only a small passage remaining between the right tonsil and uvula; neck swollen; cervical glands greatly enlarged, especially on the left side; fetid odor to breath: Klebs-Loeffler bacillus present.

Irrigations of hydrogen peroxide and Euthymol, equal parts, followed by topical treatment with Loeffler's Solution; one-half hour later the throat was irrigated with Seiler's Solution. This was repeated every two hours. Ice-collar ordered to neck, and milk diet every two hours.

One hour after admission, and forty-eight hours after the disease had developed, temperature being 101.2° and pulse 90, 12 Cc. of anti-diphtheritic serum (1000 immunizing units) were injected hypodermically in the dorsal region of the back. Two hours later, temperature was 101.2°; at 12 midnight, 100.2°; at 4 A.M., 100°; at 8 A.M., 99.2°—a fall of two degrees in fourteen hours.

At 2 P.M., temperature being 99.4°, a second injection of 12 Cc. serum was made in the back, with the following temperature reaction: Two hours later, 99.6°; four hours, 100.4°; eight hours, 100°; twelve hours, 100.2°.

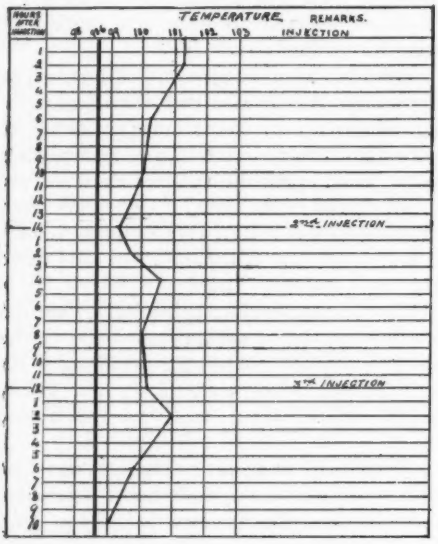
Ninety-two hours after exudate was first discovered and twenty-four hours after second injection, temperature being 100°, 2.5 Cc. of serum were given hypodermically, between the shoulders; two hours later, 4 P.M., temperature was 100°; at 8 P.M., 101°; at 12 midnight, 99.8°.

During the first thirty-six hours, patient showed marked constitutional effects from the rapid absorption of the toxalbumins; vomiting, marked prostration, languor, restlessness and mild delirium developed. It was necessary to give nourishment through a catheter passed back into the lower pharynx. Twenty hours after first injection of serum a large piece of membrane was detached, when deglutition became less difficult. Thirty hours after first injection and ten hours after the second, hyperemia was considerably subdued; six ounces of milk taken without the tube.

March 31, thirty-six hours after first injection, bright red rash observed on buttocks and calves of legs, continuing for twelve days. Swelling much reduced, deglutition much less painful; large patches of membrane detached during the morning. Third injection, of 70 minims, given at 2 P.M.; at 8 P.M. more difficulty in swallowing was noticed; slept well.

During the next four days, patient improved rapidly; patch of membrane reduced in size; April 3, had paralysis of the palate, slight regurgitation. On the tenth day the pulse dropped from 72 to 54; felt weak, with pain

about heart. April 9, membrane nearly disappeared, pulse 70. April 11, articulation better, no regurgitation. April 12, rash disappeared, throat clear. Discharged two weeks later, with slight pharyngeal paralysis.



Temperature chart of Case I.

CASE II.—C. M., age three years; admitted at 5 P. M. April 28; axillary temperature 100°, pulse 118; objective and subjective symptoms well marked; Loeffler bacillus present; exudate covering both tonsils, steadily progressing to pharynx and naso-pharynx. Had been developing about forty-eight hours; pulse very irregular and weak, showing rapid absorption.

Spray of Dobell's Solution three parts, hydrogen peroxide one part, water two parts. Loeffler's Solution applied every three hours. With temperature 100°, pulse 130, about twenty-four hours after admission, 10 Cc. of anti-diphtheritic serum were administered, with the following effect on the temperature: One hour later, 100.6°, pulse 136; two hours, 100.8°, pulse 128; three hours, 101°, pulse 128; four hours, 100.8°, pulse 120; five hours, 100.6°, pulse 116; seven hours, 99°, pulse 120; eleven hours, 99.6°, pulse 116; fifteen hours, 98.8°, pulse 104.

The condition of the throat continued to improve daily; the progressive character of the exudate was lost after two days' treatment; exudate disappeared ten days after admission; no albumin, paralysis, or rash developed. Recovery uneventful.

CASE III.—C. W., girl, age nine years; admitted 3.30 P.M. May 26; temperature 101.2°, pulse 108. Had been subject to frequent attacks of tonsillitis, which the onset of this attack simulated in every clinical feature during the first two days. The persistent and progressive character of the exudate on the second day made diagnosis doubtful, and a bacteriological examination revealed the presence of Loeffler bacilli and streptococci. On admission, two and a half days after onset, case was marked by abundance of membrane-formation over tonsils, uvula, posterior pillars, and pharyngeal wall; subjective symptoms were severe vomiting, restlessness, prostration, delirium, enlarged cervical glands, fetid breath.

Quinine sulph., 3 grains every three hours, ordered, with the regular hospital treatment; spiritus frumenti; strychnine sulph. On the fourth day of the disease 10 Cc. anti-diphtheritic serum (1500 units) were injected, temperature being 100.6°, pulse 84; four hours later, temperature 100°, pulse 84; eight hours, temperature 99.2°, pulse 72; twelve hours, temperature 99.6°, pulse 72; sixteen hours, temperature 98.8°, pulse 72. Exudate came off in pieces, and progressive character lost; throat clear eight days after admission; recovery uneventful; no albumin or paralysis. Discharged eleven days after admission.

CASE IV.—S. K., age ten years; admitted at 2 P.M. June 6, first day of the disease; temperature 100°, pulse 96. Examination on admission showed a grayish exudate on both tonsils; uvula swollen; throat hyperemic; Klebs-Loeffler bacillus present.

Regular hospital treatment was adopted. Twenty-four hours after, patient complaining of sore throat, with a temperature of 98.6°, pulse 88, 10 Cc. (1500 units) of anti-diphtheritic serum were administered, with the following effect on temperature: Three hours after, 99.4°, pulse 98; seven hours, 99.8°, pulse 84; eleven hours, 98.6°; fifteen hours, 100°, pulse 100; nineteen hours, 99.6°, pulse 94. Sixteen hours later temperature reached normal, where it remained during convalescence. Membrane improved gradually every day, a few shreds remaining on the fourth day; throat clear on the seventh day. Slight epistaxis during convalescence. Albuminuria developed five days after admission; no paralysis.

CASE V.—G. A., girl, age three years; admitted July 30; temperature 98.6°, pulse 108. Usual symptoms of invasion began about thirty-six hours prior to admission. Exami-

nation of throat revealed both tonsils swollen, spotted with exudate.

Patient was ordered the regular hospital treatment, but after twenty-four hours temperature increased to 102°, pulse 126. At first the exudate seemed to respond nicely to three-hour applications of Loeffler's Solution and the usual irrigations, but with a rise of temperature it seemed to spread with redoubled vigor, and persisted in spite of the most thorough use of local disinfectants: patient was suffering from rapid infection. Three days after admission, with membrane involving tonsils, uvula, and pharynx, temperature 99°, pulse 120, 10 Cc. of anti-diphtheritic serum were injected; three hours later temperature was 99.6°, pulse 120; after seven hours it was 99.2°, pulse 122; eleven hours, 99.6°, pulse 122; fifteen hours, 99.4, pulse 120.

The progressive character of the membrane changed within twenty-four hours. The persistence of the exudate was demonstrated by the extent of time consumed in gradual exfoliation—twelve days after admission we found the tonsils and uvula still swollen and dotted with exudate. It was not until seventeen days after admission that the tonsils were finally clear. Patient was discharged twenty-seven days after admission; no paralysis, rash, cardiac symptoms, or albuminuria developed up to the time of discharge.

Case VI.—L. G., age seven years; admitted at 2.20 P.M. August 18; temperature 100.4°, pulse 82. Symptoms of invasion developed four days prior to entrance; sore throat first appeared about thirty-eight hours before admission. Bacteriological examination made before and after admission confirmed clinical signs; objective symptoms were dysphagia, right tonsil covered with grayish exudate the size of a ten-cent piece, both tonsils hyperemic, bleeding surface remaining after removal of membrane.

Thirty hours after exudate was discovered, 10 Cc. anti-diphtheritic serum (1000 antitoxic units) were administered, with the following temperature observations: One hour later, 101°; two hours, 101.4°; three hours, 101°; four hours, 101°. Six and a half hours after injection, temperature dropped 2½ degrees to normal, from which it never varied over one degree during the subsequent course of the disease. The patch of pseudo-membrane loosened twelve hours after administering the serum, and in twenty-four hours exfoliation had progressed so rapidly that it was only one-fourth its former size; thirty-six hours afterwards the boy was feeling well, no dysphagia. The only local treatment in this case was irrigation with Euthymol one part, peroxide one part, Dobell's Solution three parts, every three hours. The disease was unattended by rash or albuminuria. Discharged fourteen days after admission.

Case VII.—W. B., boy, age 2½ years; admitted at 11.30 P.M. August 31, four and a half days after onset of attack; temperature 99°, pulse 126; condition exceedingly grave. Tonsils, uvula, soft palate, pillars of the fauces, and pharynx, edematous and covered with a grayish exudate.

Applications of Loeffler's Solution were ordered every two hours; irrigations of peroxide, Euthymol, and Dobell's Solution. Effects of the systemic infection very marked; drowsiness; prostration rapidly increasing. At 12.30 A.M., temperature being 100°, pulse 124, 10 Cc. anti-diphtheritic serum were injected, with the following temperature observations: One hour later, 100°, pulse 108; two hours, 100°, pulse 98; three hours, 98.6°, pulse 100; seven hours, 98.6°, pulse 100; eleven hours, 98°, pulse 116; fifteen hours, 98.6°. The pulse became irregular and weaker; patient very restless and delirious; no improvement in the condition of the exudate was perceptible; breathing improved slightly; no rash. Patient died twenty-six hours after admission.

Case VIII.—B. G., age nine years; admitted at 3 P.M. August 31; temperature 99.6°; pulse 104. Usual symptoms of invasion had developed about thirty-one hours before admission. Loeffler bacillus present. Diphtheritic membrane was observed on the right tonsil only, with marked hyperemia of the left tonsil and uvula.

With a temperature of 99.8°, pulse 94, 10 Cc. anti-diphtheritic serum were administered, and irrigations of Euthymol, hydrogen peroxide, and Dobell's Solution, ordered every two hours. The following temperature observations were made: Three hours later, 99.8°, pulse 94; six hours, 99.6°, pulse 86; twelve hours, 99°, pulse 82; sixteen hours, 99.6°, pulse 92; twenty hours, 99°, pulse 104; twenty-four hours, 101.8°, pulse 118; twenty-eight hours, 103°, pulse 108. Exudate forming on left tonsil; exfoliation from right. Loeffler's Solution begun; temperature dropped steadily to normal during the next twenty-four hours, from which it did not vary a degree during convalescence, a fall of 4½ degrees; the membrane disappearing entirely from the right tonsil and being much reduced in size

on the left. Patient had two attacks of epistaxis on the third day. Eight days after admission, throat entirely clear; no albuminuria, paralysis, or rash.

CASE IX.—H. B., girl, age seven years; admitted at 7 P. M. Sept. 9; temperature 103.4°, pulse 122. The usual symptoms of invasion had developed suddenly since morning. Throat was found inflamed and edematous; tonsils and uvula covered with a thick, tough exudate, of grayish appearance; neck swollen; cervical glands enlarged. Bacteriological examination showed mixed infection.

The usual hospital treatment ordered; Loeffler's Solution every two hours; ice-collar to the neck. About fourteen hours after symptoms developed, 10 Cc. anti-diphtheritic serum were administered, temperature 103.4°, pulse 122. Temperature reaction was as follows: One hour later, 102.4°; two hours, 102.2°; three hours, 103.2°; four hours, 102.8°; five hours, 102.8°; eight hours, 101.8°; twelve hours, 102°; twenty-four hours, 101°. The temperature now fell, with slight intermissions, and on the third day of the disease reached normal (pulse 80)—a fall of 4½ degrees—from which it did not vary more than a degree during convalescence. Character of the exudate improved daily, lost its ragged appearance. Six days after admission the patch on the left tonsil had disappeared, and the right was much reduced in size. Loeffler's Solution and irrigations were continued at longer intervals and the patient put upon tonic treatment. Sept. 22, shreds of membrane persisting on the uvula and left tonsil. Sept. 24, throat clear. Discharged Sept. 29; no paralysis or nephritis developed up to this time.

CASE X.—E. W., boy, age ten years; admitted at 1 P.M. Sept. 18; temperature 101.4°, pulse 120. The usual symptoms of invasion — malaise, cephalalgia, diarrhea, and epigastric pains — developed on the evening of the 16th; he then ate a hearty supper and retired early; slept well, but awoke in the morning with fever, throat dry, hot and tender, anorexia; drowsy, and slept all day. Nine cases of diphtheria within three blocks of patient's residence had died recently. On examination I found throat inflamed and edematous; thick, tough, grayish exudate covering both tonsils, uvula, and pharynx, when removed leaving raw, bleeding surface; hyperemia and edema displaced the uvula backwards; submaxillary and cervical glands enlarged; breath very offensive; a sanious discharge from the nose gave evidence of nasal infection. Almost a pure culture of Klebs-Loeffler bacillus.

Patient was placed at once on regular hospital treatment; ice-collar applied to the neck; and with a temperature of 101.6°, pulse 116, thirty hours after onset, 10 Cc. anti-diphtheritic serum were injected subcutaneously into the gluteal region, with the following temperature reaction: One hour after, 101.4°, pulse 130; two hours, 101°, pulse 126; three hours, 101.4°, pulse 120; four hours, 101.8°, pulse 120; five hours, 101.4°, pulse 124; seven hours, 101°, pulse 116; eleven hours, 100°, pulse 120; fifteen hours, 98°, pulse 106. Ten cubic centimeters anti-diphtheritic serum repeated at 4.45 P.M., twenty-seven hours after first injection. One hour later, temperature 98.8°, pulse 118; two hours, 99.2°, pulse 120; three hours, 100.2°; four hours, 100.4°, pulse 118; five hours, 100.6°, pulse 120; seven hours, 99.4°, pulse 116; eleven hours, 100°, pulse 108; fifteen hours, 100.2°, pulse 108.

Examination of throat six hours after first injection showed no improvement; exudate extending over the uvula, along both palatine arches; mild delirium; eighteen hours after first injection, membrane completely covered the arches and was extending to the soft palate. Second injection twenty-seven hours after first; fourteen hours after second injection, patient very restless, membrane extending well on to the soft palate, edges ragged, exfoliation from the tonsils begun.

Third injection nineteen hours after second, temperature being 98.8°, pulse 114. Reaction: One hour after, temperature 99.8°; two hours, 100.6°; three hours, 100.6°; four hours, 101.2°; five hours, 100.6°; eight hours, 100.4°; twelve hours, 99.2°; sixteen hours, 99°; twenty hours, 98.4°.

Sept. 20, attack of epistaxis; membrane not extending. Sept. 21, twenty hours after third injection, three days after disease began, exudate breaking down, and sharp line of demarcation along border of membrane, which appeared smooth; regurgitation of food. Fourth day, very bright, asking for more to eat; given light soft diet. Fifth day, right tonsil nearly clear; pain in ears when local applications were made, relieved by douche of hot water. Sixth day, food still regurgitated through nostrils at times; patient slept well at night. Seventh day, at 8 A. M. sudden drop of temperature to 96.2°, pulse 58; hot whiskey and milk given; noon temperature 98.2°, pulse 92. Eighth day, took nourishment better; membrane very thin; patches

on the lower border of uvula, left tonsil, and left pillar. Tenth day, membrane on lower half of uvula decreasing; small patch on both tonsils and on arch. Eleventh day, persistence of exudate on lower third of uvula; right tonsil clear; small patch on left tonsil and arch. Oct. 1st, throat entirely clear, except tip of uvula. Fourteen days after admission, throat entirely clear of exudate.

Examination of urine daily showed no abnormal constituents present until eleven days after admission, when traces of albumin were detected, which continued daily without increase until date of discharge.

CASE XI. — N. R., girl, age three years; admitted at 7 P.M. Oct. 9; temperature 99.4°, pulse 112. A brother had just died of diphtheria, and a sister had been brought in ten days previously with the disease. Patient was supposed to be suffering from a cold for the last two days. On admission to the hospital all the clinical signs of the septic type were distinctly observed: great prostration, drowsiness, restlessness, continual sanious discharge from the nose; croupy cough; breathing labored; Loeffler's bacillus present. Examination of the throat showed tonsils edematous and covered with an exudate involving the naso-pharynx and larynx.

Loeffler's Solution was ordered every three hours, to be followed in half an hour by irrigations of Euthymol one part, Dobell's Solution three parts; spiritus frumenti, 3 drachms every three hours. With a temperature, per rectum, of 99.4°, pulse 134, 10 Cc. of antidiphtheritic serum were administered hypodermically. First day patient was very restless and drowsy all day and night; breathing very difficult; cough more croupy; continual discharge from the nose. Second day, very restless; vomiting; breathing heavily; continual cough; great prostration; pulse weak and compressible, varying from 130 to 156. Patient died at 5 A.M.—temperature 101.6° —fifty-eight hours after admission.

CASE XII.—E. Q., age twenty-three years; nurse. Went on duty in the contagious wards Wednesday, Sept. 18, in perfect health; was exposed daily nursing cases of very malignant type; seemed well until the following Tuesday, six days later, when a severe attack of cephalalgia began in the morning. Previous Saturday, the 21st, had burned two fingers of the left hand, which now became inflamed, attended by great pain. Wednesday, the 25th, the lymphatics were involved as far as the elbow, red lines of infection running up the anterior and posterior surfaces of the arm. In the afternoon the symptoms became more marked, headache, malaise, myosis, nausea, vomiting, coated tongue, tenderness at the angles of the jaw; throat dry, hot, and tender, and a small patch of exudate developing on the left tonsil; cervical glands enlarged. Admitted to the isolated wards of the hospital as a patient at 6.30 P.M. Sept. 25; temperature 100.2°, pulse 94. Arm was painted with tincture of iodine; poultice applied to the hand; calomel and cascara sagrada given until the bowels moved freely. Complained a good deal of sore throat; at 9 P.M. culture taken, and Klebs-Loeffler bacillus and streptococcus demonstrated ten hours later. Temperature, midnight, 102°, pulse 96; temperature 4 A.M., 101°, pulse 100; 8 A.M., 101.8°, pulse 110.

At 9.45 A.M. 10 Cc. anti-diphtheritic serum administered. Admitted to contagious wards 11 A.M. Temperature reaction after administration of antitoxin as follows: One hour later, 102.6°; two hours, 103.6°; three hours, 103.6°; six hours, 103.6°. Patient was put upon applications of Loeffler's Solution, followed by irrigations every three hours of peroxide, Euthymol, and Dobell's Solution; ice-collar to the neck, and 3 grains quinine sulph. administered every three hours. Ten hours after first injection 10 Cc. of serum was repeated hypodermically. Temperature reaction was as follows: One hour later, 102.6°; four hours, 102°; six hours, 101°; nine hours, 101.4°; twelve hours, 101.2°. With this temperature, and pulse of 100, 10 Cc. of serum were injected into the thigh for the third time. Temperature reaction as follows: One hour later, 101°; four hours, 101°; seven hours, 103.2°; eleven hours, 102.6°; fifteen hours, 101°.

Spiritus frumenti in half-ounce doses was given on the second day and continued every three hours; strychnia sulph. $\frac{1}{30}$ grain t. i. d.; quinine was pushed hypodermically and by mouth to full physiological effects.

Sept. 27, after two injections had been given, the throat was very sore; membrane extending upwards on to the soft palate and into the naso-pharynx; complained of feeling chilly; vomited beef-tea; pain in ears; slept well during the night. Sept. 28, could swallow much better; membrane showing line of demarcation, edges smooth and turning in; rested well during the night. Sept. 29, membrane drying and exfoliating; two large pieces expectorated; dry cough; slight hemorrhage from the throat; did not sleep quite so well.

Sept. 30, membrane disappearing from tonsils and soft palate, remaining somewhat on uvula. Oct. 1, small patch on left tonsil, arch, and pillar; soft palate, uvula and naso-pharynx clear; slight cough; slept well. Oct. 2, shreds of membrane on left arch and pillar smaller; had headache, nausea, and a little vomiting. Oct. 3, throat very hyperemic; fluid regurgitated through nose; pain in back; small patch on the right and left arch, adjacent to the approximate borders of the uvula; enlarged follicles on pharynx. Oct. 4, headache, and numbness in right arm. Oct. 5, appetite very much improved. Oct. 6, membrane nearly disappeared. Oct. 7, throat entirely clear.

Membrane had remained on the throat twelve days. Nine days after the disease began, a trace of albumin was discovered in the urine; this continued with varying intensity until patient was discharged. No rash. Paralysis of the palate, which later disappeared. Discharged Oct. 16.

CASE XIII.—G. H., age five years; admitted at 3 P.M. Sept. 26; temperature 99.4°, pulse 110. Had always been strong and healthy until present illness; only child; two brothers died of laryngeal diphtheria during previous week, both within four days of onset. Three days before entering hospital, his mother first noticed that he had a slight cough and complained of pain in the throat and stomach; no other symptoms; grew worse throughout the day. On the morning of the 26th the cough became croupy. When admitted to the hospital, patient had exudate on pharynx and right tonsil; croupy cough; dysphagia, which increased every hour. Cough grew more croupy. Ice-collar applied to neck; strychnia, $\frac{1}{100}$ grain t.i.d., a.c.; spiritus frumenti, 2 drachms every four hours; bichloride of mercury, $\frac{1}{80}$ grain; tinct. ferri chloridi 4 minims, quinine sulph. 2 grains, every three hours. Inhalations of steam every four hours; calomel purge; peroxide hydrogen and Euthymol equal parts, 1 ounce, Dobell's Solution 3 ounces, for irrigation every three hours. One and one-half hours after admission 10 Cc. anti-diphtheritic serum were administered hypodermically; temperature 99.4°. Temperature reaction as follows: One hour after, 99.8°; two hours, 100.2°; three hours, 102.6°; four hours, 101.6°; five hours, 101.2°; seven hours, 100°. Fourteen hours later, temperature 99°, 10 Cc. anti-diphtheritic serum were repeated, with the following temperature observations: Two hours after, 98.6°; four hours, 98.8°; eight hours, 99.2°; twelve hours, 100°; sixteen hours, 99.2°. Twenty hours later, temperature 99°, pulse 116, a third 10 Cc. of anti-diphtheritic serum was injected. Two hours later, temperature 100.4°; six hours, 101.8°; ten hours, 102.4°; fourteen hours, 101.2°; eighteen hours, 101°; twenty-two hours, 100.4°.

Temperature averaged 99°, pulse 100, during the remaining course of the disease. The daily report is as follows: Sept. 27, coughed during the night a good deal; slept between medications; breathing very difficult, gasping for breath; intubated by Dr. W. S. Anderson, with great relief; nutritive enema given of peptonized milk, liquid peptonoids, and spiritus frumenti; breathing became gradually worse, and patient coughed up the tube at 11 P.M.; larger tube inserted by Dr. Anderson at 2.30 A.M.; no relief; breathing became very difficult and labored; exceedingly bad at 6 A.M., when, assisted by Dr. Anderson, I performed tracheotomy, the high operation, with immediate relief; color returned, breathing became slow and natural; patient slept all day and retained nourishment. Sept. 28, digitalin $\frac{1}{100}$ grain every four hours given for four doses; exudate extending on to wound; dressed with aristol. Sept. 29, great quantity of mucus expectorated through the tube; breathing labored, and cough croupy; peptone present in urine; infusion digitalis, one drachm every four hours. Sept. 30, albumin present in considerable quantity; amount of urine diminished to 11 ounces in twenty-four hours; membrane breaking down; had choking spell and expectorated large quantity of membrane; cough slight, rasping in character. Oct. 1, breathing slightly croupy in character; attack of epistaxis; discharge from the tube greatly lessened. Tube removed for the first time on the 4th, patient breathing well through the mouth and nose; removed permanently on the 6th. Patient discharged on the 18th, twenty-three days after admission, albuminuria having persisted for six days; no paralysis or rash.

CASE XIV.—A. R., girl, aged fifteen years; admitted Sept. 30, at 7.30 P.M. Brother and sister died a few days later with the same disease. Fourth day of illness patient was very weak; fainted repeatedly; had headache and diarrhea; on the following day sore throat, chills, fever, anorexia and dysphagia developed; speech thick, and difficulty in breathing. Temperature on admission, 99.8°, pulse 98.

The routine hospital treatment, Loeffler's Solution, irrigations, ice-collar to the neck,

were ordered, and with a temperature of 99.2°, pulse 96, this being the third day of sore throat, 10 Cc. anti-diphtheritic serum were injected into the thigh. Temperature was recorded every hour, but did not vary four-tenths of a degree for next six hours. Examination of throat on admission showed right tonsil covered with exudate; patch on right arch, including upper right border of uvula; small patch on upper surface of left tonsil; pharynx clear. Improved rapidly; throat clear seven days after admission. Albuminuria developed suddenly and with great severity on the third day after admission, and continued with varying intensity until discharge, seventeen days after admission.

CASE XV.—R. S., boy, age seven years, admitted at 4 P. M. Oct. 13; temperature 102°, pulse 130. Had been sick for two days; exudate appeared about twenty-four hours before admission; all the symptoms of the insidious type present. Examination showed both tonsils involved, more extensive exudation on the right; uvula and soft palate congested; glands enlarged; patient drowsy most of the time.

Regular hospital treatment instituted; also quinine sulph. prescribed in doses of 3 grains every three hours. Twelve hours after admission, temperature was 100.4°, pulse 130; membrane extending, covering both tonsils completely, spreading to the uvula. Four hours afterwards, chill; rectal temperature showed 103.6°. Sixty hours after appearance of exudate, temperature 102.2°, pulse 120, 10 Cc. (1000 antitoxic units) of anti-diphtheritic serum were injected, with the following temperature reaction: One hour later, 101°; two hours, 101.2°; three hours, 101°; four hours, 100.6°; five hours, 101°; eight hours, 99.6°; twenty-four hours, 98.8°. At midnight breathing became quite difficult, but patient rested well during the morning. Oct. 15, twenty-four hours after injection, patient felt very much better and seemed brighter, had almost no difficulty in breathing, and complained of no pain; sanious discharge from nose; membrane on tonsils lessening and its progressive character changed; patient slept well between medications. Oct. 16, membrane easily removed from left tonsil, more persistent on right; epistaxis; patient comfortable. Oct. 17, in the morning, large piece of membrane exfoliated; only a few points remaining on tonsils; small patch on pillar; patient seems very bright; appetite good. Five days after admission, throat entirely clear; convalescence uneventful; no rash, cardiac symptoms, paralysis, or nephritis.

CASE XVI.—M. G., girl, age 1½ years; admitted at 4.30 P.M. Oct. 2, on the third day of illness; rectal temperature 100.8°, pulse 126. A sister had just died at home of the disease. On inspection we found both tonsils and pillars of the fauces covered with a grayish exudate; Loeffler bacillus demonstrated; tonsils so greatly swollen it was not possible to see the pharynx; ordinary subjective phenomena present.

Ten cubic centimeters anti-diphtheritic serum were injected, with the following temperature reaction: One hour later, 101°; two hours, 101.2°; three hours, 99.6°; five hours, 100.2°; seven hours, 100.6°; eleven hours, 98.8°; fifteen hours, 100.8°. During the next sixteen hours the temperature dropped to normal; it did not afterwards rise more than one degree, except when gastro-intestinal trouble developed late in convalescence. Patient was given regular hospital treatment. Oct. 3, twenty-four hours after antitoxin treatment, restlessness and fretfulness noted; breathing more labored; membrane very persistent. Oct. 4, patient drowsy, refused all nourishment, but breathed more easily. Oct. 5, nourishment taken much better; patient rested well. Oct. 6, urticarial rash on cheeks in the morning; stomach greatly disturbed; nourishment given by nutritive enemata, liquid peptonoids, milk and whiskey three times a day. Convalescence slow but uneventful; discharged Oct. 26; returned twice for treatment, having developed acute bronchitis. Rash appeared four days after antitoxin was given, but quickly subsided. Gastric disturbance in this case was very well marked during the entire course of the disease, and was sufficient to cause the skin lesions; no cardiac symptoms, paralysis, or nephritis.

CASE XVII.—J. P., boy, age three years, admitted at 8 P.M. Oct. 20, with the usual symptoms of a well marked case. Sore throat had developed about three days before; both tonsils were covered with a grayish exudate; glands of the neck enlarged; posterior nares and nose involved; culture showed mixed infection.

The usual hospital treatment, calomel purge, irrigations, and Loeffler's Solution, were ordered; patient was exceedingly restless and fretful. With temperature of 99.2°, pulse 120, 10 Cc. anti-diphtheritic serum (1000 antitoxic units) were injected. One hour later, temperature 100°; two hours,

98.2°; three hours, 99.4°; four hours, 98.8°; nine hours, 100.8°; thirteen hours, 100.4°. Fourteen hours after first injection, 10 Cc. repeated, temperature being 100.2°, pulse 130; one hour later, temperature 99.8°; two hours, 99.6°; four hours, 99°; six hours, 100.2°; ten hours, 99.6°; fourteen hours, 99°.

The exudate showed marked improvement and lost its progressive character from the first. Three days after first injection throat was entirely clear; patient could breathe through the nose without much difficulty; a discharge still continued, however, for the subsequent five days. On the sixth day there was slight recurrence of membrane on the right tonsil, which cleared rapidly. The ninth day after the first injection, urticaria developed on the face, neck, and back; patient was restless and fretful; this disappeared within two days. Albuminuria developed on the fourth day after the first injection of the serum, but rapidly disappeared. Patient was discharged Nov. 5, fifteen days after admission, and was in good physical condition when seen two weeks later; no paralysis or other sequelæ had developed, and patient seemed perfectly well.

CASE XVIII.— Paul P., age twenty-one months; brother of last case; admitted Oct. 20, 8 P. M.; temperature 99.6°, pulse 132. Diphtheria of the laryngeal type. An elder brother had just died of the disease. Case exhibited marked symptoms of dyspnea— suppression of voice, recession of chest-wall, restlessness; the breathing was becoming rapidly more labored; with each respiration there was retraction in a marked degree of all the tissues of the chest and epigastrium.

With temperature 99.6°, 10 Cc. anti-diphtheritic serum (1000 units) were administered, and tracheotomy, the high operation, performed by Dr. Barrett; relief was instantaneous; the labored breathing subsided to a slow, normal respiration; patient slept throughout the entire night, except when awakened for medications; spiritus frumenti, 20 minims, given hypodermically every two hours; steam atomizer containing one drachm sodium bicarb. to one pint water sprayed continuously over tracheotomy tube; the membrane loosened, and pieces were expectorated from time to time. Temperature reaction after administration of antitoxin was as follows: Two hours later, 100.4°; three hours, 100.2°; four hours, 99.8°; five hours, 100°; six hours, 99.8°; ten hours, 100.2°. A second injection of 10 Cc. was given seventeen hours after first injection, temperature being 101.2°, pulse 130. This was followed in three hours by 5 Cc., and two hours later by 5 Cc. During this time the temperature range was as follows: Two hours after, 100°; three hours, 101.2° (5 Cc.); four hours, 101°; five hours, 100.4° (5 Cc.); six hours, 100°; eight hours, 99.8°; ten hours, 100°; fourteen hours, 99.8°; nineteen hours, 101° (5 Cc.); twenty-one hours, 101°; twenty-four hours, 101.2°; thirty-one hours, 100.6° (5 Cc.); thirty-two hours, 100.6°; thirty-five hours, 100.2°. Oct. 21, had severe choking spell; twenty-four hours after operation, tube was removed, cleaned, and replaced; this became again necessary eight hours later, relieving the breathing considerably. Oct. 22, had several spells of difficult breathing, when the entire tube was removed; expectorated large pieces of membrane. Oct. 23, tube removed twice, followed by fluid discharge. Oct. 25, much brighter, appetite very much improved. Oct. 26, six days after first dose of antitoxin, urticaria developed on face, back, and abdomen; wheals very numerous in the early morning, almost disappearing in the afternoon. Oct. 29, patient again breathed through mouth and nose; discharge less tenacious. Oct. 30, tube permanently removed. Nov. 7, recurrence of membrane on left tonsil, and difficult breathing with croupy cough developed. Temperature being 99.4°, pulse 128, 10 Cc. antitoxin was given at 7.15 P. M., with the following effect: One hour after, temperature 98.4°; two hours, 98°; three hours, 98.4°; five hours, 99.2°; thirteen hours, 99.4°. Patient rapidly convalesced until Nov. 18, when temperature rose to 103° and breathing became labored; fell to 100 at 8 A.M., but rose at 4 P.M. to 103.4°; under the exhibition of phenacetin, one grain every hour, it dropped to 99°. Patient discharged on the 21st; no paralysis; no albumin.

CASE XIX.—J. H., girl, age fourteen years; admitted Oct. 25, 10 A.M.; temperature 99.2°, pulse 100. Was taken sick seven days before; showed usual symptoms of invasion; no pain except in throat; tonsils and uvula covered with exudate when seen by Dr. Meade, Monday before admission; pharynx and naso-pharynx involved next day, patient growing steadily worse. On admission, tonsils, uvula, pharynx and naso-pharynx completely covered with exudate; almost no constitutional symptoms of absorption. It was not thought advisable to give antitoxin, as this was the seventh day of the disease. Patient was put upon Loeffler's Solution and irrigations of peroxide, Euthymol and Dobell's

Solution every three hours, but exudate remained persistent in spite of all local disinfectants; membrane spread rapidly through the nose down into the larynx, involving the pharynx more extensively, and becoming much thicker than when treatment was begun; constitutional symptoms of toxemia were becoming more marked every hour, as was also the difficulty in breathing. It became a question as to whether laryngeal stenosis or systemic infection would be the cause of death.

At this juncture, eleven days after the first symptoms of invasion, 10 Cc. antitoxin were given, with a temperature of 102.4°, pulse 112. One hour later, temperature was 101.2°; two hours, 101°; three hours, 100.4°; four hours, 99.8°; five hours, 100.2°; six hours, 98.4°—a fall of exactly four degrees in six hours. The breathing, however, became more labored, and symptoms of cyanosis developed rapidly; the patient could not speak and was exceedingly restless. At 9 A.M., nine hours after the first dose, 5 Cc. antitoxin were injected, temperature being 99.8°, pulse 110. Tracheotomy, the high operation, was now performed by Dr. Barrett, with immediate relief, and the symptoms of obstructive dyspnea quickly subsided. Directly after the operation the remainder of the vial of antitoxin, 5 Cc., was administered, temperature 99.6°, pulse 110. Two hours later, temperature was 99.8°; three hours, 101°; five hours, 100.4°; six hours, 102.8°; seven hours, 102.2°. Again 10 Cc. of antitoxin were given, and one hour later the temperature was 101.8°; three hours, 101.2°; four hours, 100.4°; five hours, 101.2°; seven hours, 100.2°. One hour after this inoculation, twenty-two hours after first injection, 30 Cc. having been given, the patient expectorated a large piece of membrane, one-half the size of the tube, and two hours later another piece of the same size.

During thirty-six hours subsequent to the third injection and tracheotomy the following phenomena were recorded: Expectorated six large pieces of membrane, one being cylindrical, size of the tube, one-half inch in length; discharge from the nose lessened; tonsils clear; only traces of membrane remaining in the pharynx and uvula—which disappeared entirely three days later; there was a continuous fall in pulse and temperature; during the critical period after the operation the heart was supported by active stimulation; tube was removed for a short time on the sixth day and permanently on the thirteenth day; the wound granulated rapidly, and convalescence was uninterrupted, though attended by a slight laryngeal cough; rash appeared on the sixth day after the first injection, but quickly disappeared; examination of urine on admission showed trace of albumin, but this disappeared before antitoxin was given, and daily examination gave no evidence of its return; patient had no paralysis or other sequelæ; was discharged Nov. 19, twenty-five days after admission.

CASE XX.—W. H., boy, age six years; admitted Oct. 29, 11 P.M.; temperature 100°, pulse 136. Was taken ill the previous day; had every symptom of membranous croup; examination of throat and nose showed no exudate present; symptoms entirely laryngeal; breathing very much labored; Klebs-Loeffler bacillus present.

Condition of patient throughout the night showed every indication of a rapidly progressing laryngeal stenosis. Ipecac was given every fifteen minutes until nausea supervened; mustard foot-baths, mustard stupes to the chest, ice-collar, and intubation; but with no relief—patient was becoming cyanotic and the breathing grew rapidly worse. Tracheotomy, the high operation, was performed by the house surgeon, Dr. Barrett; the dissection was made slowly, very little hemorrhage was encountered, and the result was immediate relief of dyspnea, together with the discharge of a great quantity of mucus and pseudo-membrane; patient breathed quietly and was very comfortable all day. Temperature being 101.4°, pulse 130, 10 Cc. (1000 units) anti-diphtheritic serum were administered at 12.15 P.M., four hours after tracheotomy. The following effect on the temperature was observed: One hour later, 100.6°; two hours, 100.4°; three hours, 101.2°; five hours, 101.6°; eight hours, 101°; twelve hours, 100°; sixteen hours, 100°. Patient improved very slowly; twenty-one hours after first inoculation, 6 Cc. of serum were injected, temperature being 99.8°; pulse and temperature were taken every hour, showing a reaction of only four-tenths of a degree. At midnight the serum was repeated, nine hours after the second dose, temperature being 100.2°; subsequent record for five hours shows rise and fall of four-tenths of a degree. Tracheotomy tube removed permanently eighteen days after operation; wound granulated slowly; convalescence was prolonged. Severe laryngeal and bronchial cough.

Patient was weak and emaciated when admitted; marked albuminuria developed on

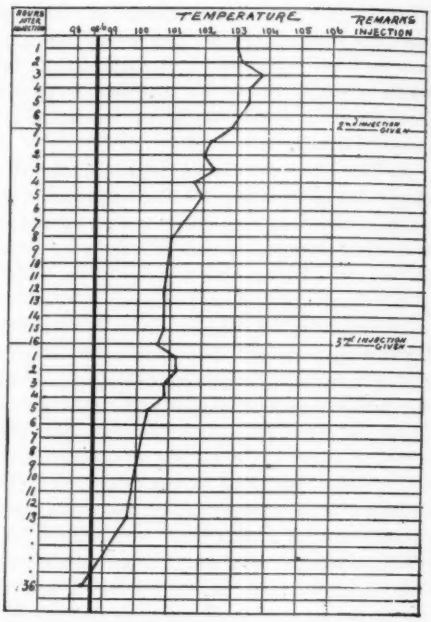
the eighth day, continuing with attendant symptoms for eleven days; reaction normal on discharge. An active supportive and tonic treatment was carried out throughout the entire course of the disease; patient discharged six weeks after admission.

CASE XXI.—E. R., age twenty-one years; admitted Oct. 29, at 4 P.M.; temperature 100°, pulse 96. Had sore throat and symptoms of invasion during the past twenty-four hours. Examination of throat showed tonsils spotted with exudate, also right side of pharynx.

The regular hospital treatment was ordered, and with a temperature of 98.5°, pulse 84, 10 Cc. anti-diphtheritic serum (1000 units) were given; hourly temperature showed a variation of less than one degree; patient improved rapidly; convalescence uneventful; urticaria attended by intense itching appeared thirteen days after inoculation. Discharged twelve days after admission.

CASE XXII.—F. S., boy, age eight years; admitted Dec. 8, 4 P.M; axillary temperature 103.1°, pulse 108; second day of the disease. Eight children in the family had diphtheria within the last twenty-four days, two having died. Patient had headache, vomiting, anorexia, delirium, and great prostration; lay in a stupor, from which we could scarcely rouse him; breathing obstructed, muscles twitching, glands swollen and edematous; remained in stupor throughout the night; did not know he had been brought to the hospital. Exudate covered both tonsils, adjacent walls of the uvula, left side of the pharynx and naso-pharynx; fetid breath; Loeffler's bacilli and streptococci present.

Ten cubic centimeters (1000 units) anti-diphtheritic serum were injected one hour after admission, followed by a second dose six and a half hours later, and a third dose twenty hours after the second. Regular hospital treatment also. Ten hours after second inoculation, exudate had extended over soft palate and arches; general condition very much better; less pain on swallowing; much brighter. Twenty-four hours later herpes developed on cheeks; breathing much improved; membrane one inch square covering soft palate became loosened and was removed by the forceps; patient bright and talkative. Dec. 11, exudate entirely disappeared from left tonsil, uvula, and naso-pharynx: small patch on right tonsil. Dec. 12, membrane in shreds on right tonsil, palate, and anterior pillar. Dec. 13, point of exudate on anterior pillar; remainder of throat clear. Dec. 14, five and a half days after admission, throat entirely clear; slight regurgigation of fluids; paralysis of the palate developed; voice affected; slight trace of albumin. Dec. 15, albumin disappeared. Discharged sixteen days after admission, paralysis greatly improved.

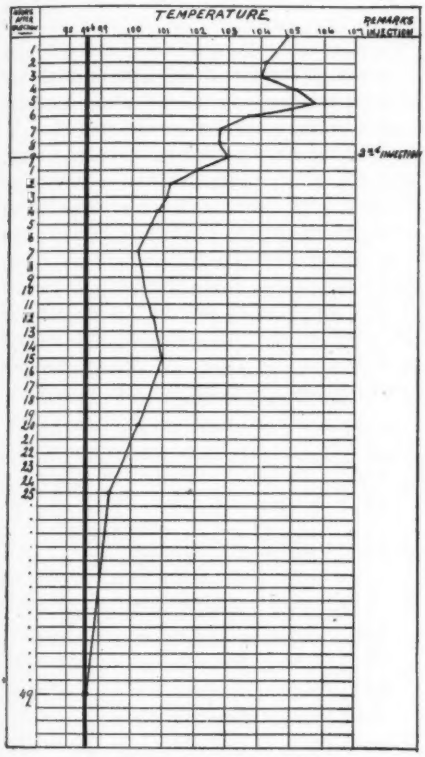


Temperature chart of Case XXII.

CASE XXIII.—B. R., girl, age nineteen years; admitted at noon Dec. 8; temperature 104.8°, pulse 128; twelve hours after onset. Had chill, dizziness, sleeplessness, dysphagia, anorexia; tonsils, uvula, soft palate, pillars, pharynx and nares covered with exudate; fetid breath; stupor and prostration; pure culture Loeffler bacilli.

Patient was given a sponge bath, followed by regular hospital treatment, together with antitoxin, 8 Cc. Six hours later, temperature lower, patient feeling much better; headache less; no backache; throat less sore. Antitoxin, 10 Cc., given eight hours after first dose. Nine hours later the following observations were made: Exudate rapidly loosening, and line of demarcation formed; two large pieces of membrane removed; temperature 100.2°, a drop of 4.6 degrees in twelve hours. Dec. 10, no extension in the last twelve hours; rapid exfoliation of membrane; membrane remaining on tonsils, pillars, arches, and soft palate; large pieces removed; slight herpes developed on left cheek. Dec. 11, pharynx clear; no discharge from nose; naso-pharynx clear; small patches on tonsil and tip of uvula. Dec. 12, pain in region of kid-

neys; membrane on left tonsil and pillars and approximate border of the uvula. Dec. 13, five days after admission, throat clear, except one small spot on left tonsil. Dec. 15, throat clear; no pain. No albumin or paralysis. Discharged Dec. 24.



Temperature chart of Case XXIII.

CASE XXIV.—J. W., boy, age seven years; admitted Dec. 10, 2 P.M.; temperature 101.7°, pulse 108; third day of the disease. Thick grayish exudate completely covering both tonsils and uvula; tissues of throat greatly swollen; no view of pharynx possible; breathing obstructed; thick discharge from nose; frequent epistaxis; Loeffler's bacillus and streptococcus present.

Ten cubic centimeters (1500 units) antidiphtheritic serum were given, together with regular hospital treatment; temperature fell in four hours to 100.2°. Twenty hours after first dose, with temperature 102.2°, 10 Cc. (1000 units) were repeated, temperature falling to 98.2° during subsequent twenty-four hours. Condition of throat now showed great improvement daily; membrane entirely gone six days after admission. Dec. 24, discharged; no rash or paralysis.

CASE XXV.—I. M., girl, age twenty-one years; admitted 5.30 P.M. Dec. 13, on the fifth day of the disease. Felt perfectly well on the 7th, but next day the usual symptoms of invasion began; grew worse daily; twenty-four hours before admission, symptoms of laryngeal stenosis began. On admission, both tonsils, nares, pharynx, naso-pharynx, uvula and larynx were completely covered with membrane; breath fetid; breathing labored; croupy cough.

With temperature 101°, pulse 140, 10 Cc. (1000 units) anti-diphtheritic serum were administered. Temperature range: One hour later, 103°, axilla; two hours, 103.6°, rectum; four hours, 103.2°; five hours, 103°. Again 10 Cc. of serum were given, temperature being 102.3°. Two hours later, temperature 102.8°; three hours, 102.4°; four hours, 102.2°; five hours, 102.6°; nine hours, 102.2°. Serum, 10 Cc., being again repeated, the temperature fell six-tenths of a degree in the next four hours. Regular local disinfectants were used, together with inhalations of steam containing tinctura opii camphorata, tinctura benzoini composita, equal parts, one drachm, to aqua one pint. Every four hours continuous inhalations from a steam atomizer containing sodium-bicarb. solution, which together with antitoxin gave immediate relief.

Twelve hours after first dose of serum, large pieces of membrane were expectorated from the larynx and pharynx; dyspnea greatly relieved; patient's condition improved rapidly. After second dose of antitoxin, exfoliation more rapid; the extensive, progressive character of the exudate was lost. Loeffler bacillus and streptococci present. On the third night after admission, patient slept well, breathing quietly, with mouth closed. Albumin present, but disappeared Jan. 1.

CASE XXVI.—M. J., age twenty-four years; Armenian; housewife; primipara; admitted to Woman's Hospital Nov. 17, noon, in labor; general health and physical condition good; temperature 98.4°, pulse 78.

Patient was given a bichloride sponge bath, douche, and enema; forceps delivery; presentation, R. O. A., 3 P.M. Nov. 18, Dr. Jessie L. Herrick attending.

	Temperature.		Pulse.	
	A.M.	P.M.	A.M.	P.M.
First day after delivery	98.8°	100°	86	96
Second day	98	99	78	88
Third day	102	103.8	110	114
Fourth day	101.2	102	96	102

At noon of the fourth day the axillary temperature was 103.8°, pulse 114. During the following six days the temperature fell in the morning, followed by evening exacerbations;

highest evening temperature 105°, lowest 99.4°. No unusual symptoms until the morning of third day, then headache; chill at 3 P.M. Examination revealed pseudo-membrane completely covering vaginal erosions; lochia suppressed; pain in abdominal region increased. Staphylococci and Klebs-Loeffler bacilli present. On the seventh day, vomiting attack; respiration short and irregular; diarrhea with signs of beginning peritonitis. On the tenth day dermatitis simulating serpiginous erysipelas developed, with great swelling of right labium, extending gradually over the gluteal region, down the thighs, up the back to the spine and inferior border of scapula. Serum was then given, extension continuing until temperature became normal, when desquamation began.

Thirteen days after delivery, midnight, with temperature 103.6°, pulse 92, 10 Cc. (1000 units) of anti-diphtheritic serum were administered hypodermically. One hour later, temperature 104.2°, pulse 92; three hours, 103.2°, pulse 88; five hours, 103.6°, pulse 90; seven hours, 101.8°, pulse 90; nine hours, 101.6°, pulse 90; thirteen hours, 102.6°, pulse 94. Sixteen hours after first injection a second and like injection was given; temperature one hour later, 102.6°; two hours, 101.8°, pulse 88; four hours, 103.6°, pulse 90. During the next three days, morning and evening rise lessened; temperature was normal for the first time the fourth day after inoculation, remaining normal after the fifth day.

Locally, hydrogen peroxide, two ounces, every two hours; intra-uterine douche, bichloride 1:5000, twice a day for three days; permanganate-of-potassium (one grain to the ounce) douche every day; nuclein hypodermically, 80 drops, three times a day; quinine and whiskey *ad libitum*. Two similar cases, confined within the subsequent twenty-four hours in the same institution but not treated with antitoxin, terminated fatally.

Table of Twenty-five Cases of Diphtheria Treated with Anti-diphtheritic Serum at Harper Hospital, Detroit, Mich.

Case No.	Day of Disease	Age.	Character.	Type.	Paralysis	Albuminuria.	Exanthem.	Time in Hospital	Result.	Amt. of Antitoxin Used.	Notes.
I.	2d.	17	Severe.	Tonsillar, pharynx.	Palate.	None.	Erythema.	28 days.	Recovered.	26½ Cc.	1000 units.
II.	2d.	3	Severe.	Tonsillar, pharynx.	None.	None.	None.	22 days.	Recovered.	10 Cc.	1000 units.
III.	4th.	9	Moderate.	Tonsillar, pharynx.	None.	None.	None.	11 days.	Recovered.	10 Cc.	1500 units.
IV.	2d.	10	Moderate.	Tonsillar, pharynx.	None.	Slight.	None.	13 days.	Recovered.	10 Cc.	1500 units.
V.	3d.	3	Severe.	Tonsillar, pharynx.	None.	None.	None.	27 days.	Recovered.	10 Cc.	1000 units.
VI.	2d.	7	Mild.	Tonsillar, pharynx.	None.	None.	None.	14 days.	Recovered.	10 Cc.	1000 units.
VII.	5th.	2½	Severe.	Pharynx, larynx.	None.	None.	None.	26 hrs.	Died.	10 Cc.	1000 units.
VIII.	2d.	9	Mild.	Tonsillar.	None.	None.	None.	.....	Recovered.	10 Cc.	1000 units.
IX.	1st.	7	Severe.	Tonsils, pharynx.	None.	None.	None.	20 days.	Recovered.	10 Cc.	1000 units.
X.	2d.	10	Severe.	Nares, pharynx.	Palate.	Present.	None.	23 days.	Recovered.	30 Cc.	1000 units.
XI.	2d.	3	Severe.	Nares, pharynx, larynx.	None.	None.	None.	2½ days.	Died.	10 Cc.	1000 units.
XII.	12 hrs.	23	Severe.	Pharynx.	Palate.	Present.	None.	21 days.	Recovered.	30 Cc.	1000 units.
XIII.	3d.	5	Severe.	Tonsils, larynx, pharynx.	None.	Present.	None.	23 days.	Recovered.	30 Cc.	1000 units; intubation and tracheotomy.
XIV.	3d.	15	Moderate.	Pharynx.	None.	Present.	None.	17 days.	Recovered.	10 Cc.	1000 units.
XV.	1st.	7	Moderate.	Nasal, pharynx.	None.	None.	None.	10 days.	Recovered.	10 Cc.	1000 units.
XVI.	3d.	1½	Moderate.	Pharynx.	None.	None.	Urticaria.	24 days.	Recovered.	10 Cc.	1000 units.
XVII.	3d.	3	Moderate.	Pharynx.	None.	Present.	Urticaria.	15 days.	Recovered.	20 Cc.	1000 units.
XVIII.	3d.	1¾	Severe.	Larynx.	None.	None.	Urticaria.	32 days.	Recovered.	50 Cc.	1000 units; tracheotomy.
XIX.	11th.	14	Severe.	Pharynx, larynx.	None.	None.	Urticaria.	25 days.	Recovered.	30 Cc.	1000 units; tracheotomy.
XX.	2d.	7	Severe.	Larynx.	None.	Present.	None.	48 days.	Recovered.	26 Cc.	1000 units; intubation and tracheotomy.
XXI.	1st.	21	Mild.	Tonsillar, pharynx.	None.	None.	Urticaria.	12 days.	Recovered.	10 Cc.	1000 units.
XXII.	2d.	8	Severe.	Tonsillar, pharynx.	Palate.	Trace.	Herpes.	16 days.	Recovered.	30 Cc.	1000 units.
XXIII.	12 hrs.	19	Severe.	Tonsillar, pharynx.	None.	None.	Herpes.	16 days.	Recovered.	18 Cc.	1000 units.
XXIV.	3d.	7	Severe.	Tonsillar, pharynx.	None.	Trace.	None.	14 days.	Recovered.	20 Cc.	1st 1500 units, 2d 1000 units.
XXV.	4th.	21	Severe.	Nasal, pharynx, larynx.	None.	Present.	None.	42 days.	Recovered.	30 Cc.	1000 units.

Summary—Twenty-five Cases.

Treatment begun:	No.	Per Cent.	Died.
First day of disease	7	28	0
Second day of disease	7	28	0
Third day of disease	7	28	1
Fourth day of disease	3	12	1
Fifth day of disease or later	1	4	0

Age Distribution:	No.	Per Cent.
Cases under 5 years	7	28
Cases under 10 years	9	36
Cases under 15 years	4	16
Adults	5	20
Sequelæ:		
Paralysis	4	16
Albuminuria	8	32
Exanthem	8	32
Died	2	8
Character of Diphtheritic Attack:		
Mild	3	12
Moderate	6	24
Severe	16	64
Type:		
Laryngeal	7	28

TEMPERATURE REACTIONS.

Temperature being 102° or above at time of injection:	
Number of injections	13
Followed by direct fall of temperature (1° to 4°) within 15 hours	7
Slight rise (.2° to 1.5°) followed by marked fall	5
No effect (.2°)	1
Temperature being below 102° at time of injection:	
Number of injections	34
Followed by immediate fall (2–4 hours)	17
Followed by rise and fall	14
Slight effect	3
Temperature variation less than .5°	6
Followed by continuous remission	11
Total number of inoculations	47

Cases I and II were attended by Dr. D. S. Campbell; III and IV by Dr. Gailey; V to XI, XIII and XIV by Dr. Mulheron; XII and XXI by Dr. E. L. Shurly; XV to XX and XXII to XXV by Dr. Geo. Duffield; XXVI by Drs. Manton, Longyear, Carstens, and Jessie L. Herrick.

CONCLUSIONS:

1st. The cases were under constant observation from the time of admission to discharge; this being in contradistinction to cases observed in private practice.

2d. Nurses of the Farrand Training School were on special duty night and day.

3d. Diagnosis of every case was verified by bacteriological examination.

4th. Cases were not selected; admitted in all stages of the disease.

5th. There were four cases of tracheotomy, two being combined with intubation. All recovered.

6th. The use of repeated doses of the serum (from the laboratory of Parke, Davis & Company) was of the greatest importance.

7th. No case died that was treated within two days of invasion.

8th. No case developed laryngeal stenosis after anti-diphtheritic serum was given.

9th. No case developed anuria, convulsions, or severe hemorrhages.

10th. No abscesses.

11th. No deleterious effects.

12th. None of the cases under treatment became septic.

13th. No constant effect on the temperature or pulse. Temperatures above 102° usually fell one to five degrees in fifteen hours.

14th. The membrane loses its progressive character under this treatment.

15th. No case of heart paralysis or other heart lesion developed.

16th. Four cases very suddenly improved.

17th. Sixteen cases were above average severity.

18th. Albuminuria developed in eight cases. With one exception, all showed normal reaction before discharge. No casts found.

19th. Paralysis was not prevented. Four cases, or sixteen per cent., developed. Average without antitoxin, ten to twenty per cent.

20th. Rash developed in eight cases, quickly disappearing.

21st. There were two deaths, or eight per cent., one case being moribund on admission.

22d. One case recovered, with typical reaction, when injected on the eleventh day of the disease.

23d. The serum does not interfere with the use of local disinfectants or antiseptics.

24th. Subsidiary local and constitutional treatment must not be neglected.

25th. In the future we shall not feel justified in neglecting serum therapy.

26th. It is a specific remedy when used early.

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*EPISCLERITIS AND ITS TREATMENT.**

By C. A. Veasey, M.D.,

Adjunct Professor of Ophthalmology in the Philadelphia Polyclinic; Chief Clinical Assistant to the Ophthalmological Department of the Jefferson Medical College Hospital; Consulting Ophthalmologist to the Philadelphia Lying-in Charity Hospital, etc.

Episcleritis is a form of localized inflammation occurring in the anterior segment of the eyeball, and affecting that portion of the en-

* The substance of a lecture delivered before the class at the Philadelphia Polyclinic.

velope of the eye which lies between the conjunctiva in front and the dense sclera proper behind, or what is usually known as the episcleral tissue. It usually appears as a small reddish or purplish nodule, sometimes elevated, sometimes flat, the most frequent point of selection for the primary patch being somewhere in the ciliary region between the corneo-scleral margin and the insertion of the external rectus muscle, though it may appear in any portion of the episcleral tissue lying in front of the equator of the eyeball.

This primary nodule is the centre of a circumscribed inflammation, the vessels in which assume a violaceous tint, and over which the somewhat swollen conjunctiva can be freely moved, the inflammatory patch itself being firmly attached to the sclera and immobile.

The subjective symptoms vary greatly in different cases. In some there is very little discomfort experienced; they simply come to us complaining of a small patch of redness on the eyeball. In others there is the most excruciating pain, supra-orbital and temporal in character and occasionally appearing in the occipital region, depriving the patient of sleep. In addition there is photophobia, lachrymation, and great tenderness on pressure, the patient shrinking backward when the least pressure is made upon the eyeball through the closed lid.

These symptoms begin to disappear gradually in the course of a few weeks, the nodule is being absorbed, and just as we are congratulating ourselves that the inflammatory process is about to terminate, another nodule makes its appearance in the neighborhood of the first one, and the same tedious inflammatory process has to be again contended with. It may be that the patient gets entirely well of the first attack and has an intermission during which the eye is in an apparently healthy condition, before the second nodule makes its appearance. But in the majority of cases it does make its appearance, and frequently the attacks continue to recur, one after another, with very little intermission, until the whole circumference of the sclera has been involved; and whenever a nodule disappears it leaves in its place a bluish-gray spot, so that sometimes a complete line of such spots can be observed encircling the sclera some distance from the corneal margin, forming a circum-corneal zone. When this stage is reached the disease has usually spent itself, and recovery takes place, a nodule rarely, if ever, appearing on a site occupied by a former one.

The causes of this disease are as numerous and varied as its symptoms. The general consensus of opinion seems to be that it is more frequent in women than in men, and certainly this has been my experience, though it is claimed by some to appear more frequently in the male sex. It is also more often seen in adults than in young people. Disorders of menstruation and uterine affections in general, as well as the different diatheses, such as the scrofulous, the syphilitic, the rheumatic, the gouty, the malarial, and the uric-acid, are all undoubtedly predisposing causes. Some attacks can be traced to exposure to the weather, while others seem to be idiopathic in origin.

The two affections most likely to be confounded with episcleritis are phlyctenular conjunctivitis and phlyctenular kerato-conjunctivitis. In the latter disease the nodule is situated at the corneo-scleral margin. In phlyctenular conjunctivitis it is situated away from the corneal margin and more nearly resembles episcleritis; but in episcleritis the nodule never ulcerates, while in the other two affections it generally does ulcerate. Again, in episcleritis the swollen conjunctival vessels are readily moved *over* the episcleral patch, showing that it lies beneath the conjunctiva, the latter membrane being the one that is inflamed in phlyctenular conjunctivitis and, in addition to the cornea, in phlyctenular kerato-conjunctivitis. It is not always an easy matter to distinguish between episcleritis and scleritis in the early stages, as there is no marked visible boundary line between the superficial and the deep scleral tissue. But the course always determines the disease: episcleritis, beyond being a long, tedious, and constantly recurring affection, ends in no injury to the globe of the eye, while scleritis almost always causes some serious consequences by an extension of inflammation to some of the internal structures, especially the uveal tract, and in subsequent thinning and staphylomatous bulging of the sclera.

The course of the disease is essentially a chronic one, and no matter how slight the inflammation may be when the case comes under observation our prognosis should be a guarded one. The disposition to recurring attacks should be fully explained and the patient assured that although the duration of the affection sometimes extends over a period of several months, or even years, the ultimate outcome is good, as there very seldom results any permanent injury to the visual acuity.

It is readily understood that a disease that

can be attributed to so many different causes necessarily has no one specific plan of treatment. The primary cause in each case must be ascertained, if possible, and removed, and the special symptoms combated as they arise.

Should there be found any trace of syphilis, the anti-syphilitic remedies, mercury and iodide of potash, must be pushed to the point of tolerance. And in connection with the administration of these two remedies it is well to bear in mind that the patient can be more readily brought under the influence of the former drug by inunctions or by hypodermatic injections than by absorption through the stomach, and that the latter drug will be less liable to disagree with the patient if administered each time in a large quantity of water and between the periods of greatest activity of the stomach, in other words about two hours and a half after the ingestion of meals.

If there is any indication of rheumatism or gout — and, according to some authorities, these two diseases, or at least the diatheses, are the exciting causes of the larger number of cases of episcleritis—some form of the salicylates or colchicum must be administered. If the uric-acid diathesis be present, some of the uric-acid solvents are indicated, in addition to the imbibition of large quantities of natural spring mineral waters containing lithia. Should the scrofulous or tubercular diathesis be found, the administration of cod-liver oil and creosote is indicated, as would be quinine if malaria were detected.

Diaphoresis obtained either by the administration of pilocarpine, by the mouth or hypodermatically, or by means of the Turkish bath, frequently assists materially in hastening the process of absorption; but prior to the employment of diaphoresis by any method the condition of the heart should be carefully ascertained.

In appropriate cases careful search must be made for any uterine disorder. The speaker has seen several patients suffering from episcleritis, who in spite of all the treatment being given them failed to get any better, rapidly improve as soon as some slight uterine difficulty had been corrected.

For the local treatment of the eye itself no strong astringents or irritating remedies should ever be used. They do more injury than good. If there is any secretion from the accompanying conjunctivitis, the conjunctival cul-de-sac can be washed out two or three times daily with a saturated solution of boric acid. If the inflammatory process be very severe, two or three Swedish leeches can be placed on the temple or at the angle of the eye. Compresses as hot as can be borne, continued for fifteen to twenty minutes at a time and repeated every three or four hours, often add to the comfort of the patient and in addition assist to promote absorption of the inflammatory products. Should there be the least tendency to iritis, a solution of atropine must be instilled sufficiently often to keep the accommodation paralyzed. On the contrary, if there be no sign of such complication a solution of eserine and cocaine may be more soothing, about one-sixth of a grain of eserine and five grains of cocaine to the ounce of distilled water, a few drops to be instilled into the conjunctival cul-de-sac every three or four hours, or even more frequently if the pain be severe. In some cases the use of a pressure bandage at night relieves the patient of pain to such an extent that more refreshing sleep can be obtained.

Should the patient not be relieved of the pain by the above means, it becomes necessary to resort to the use of some drug to accomplish the purpose. Of these the best seems to be antipyrin or phenacetin in five- or ten-grain doses, repeated if necessary. I have occasionally gotten rid of much of the accompanying neuralgia by having rubbed into the skin over the course of the supra-orbital nerve, and into the temple, an ointment composed of equal parts of mercurial and belladonna ointments with just enough lanolin added to make it more pliable.

Electricity has also been frequently used of late, and is best applied by means of the galvanic current, the positive pole being placed over the closed lid, the negative pole behind the ear or on the back of the neck. The amount given is about two milliampères, and a daily séance should be held, at first lasting from three to five minutes, the time between the séances to be increased and the duration of the application lengthened. Many cases that resist all other means of treatment and that seem hopeless as far as shortening the duration of the disease is concerned, can be markedly improved by a few applications of galvanism.

Within the past few years many excellent reports have been published concerning the treatment of this affection by means of the subconjunctival injection of a solution of mercuric chloride. The strength of the solution is 1:2000, and about four minims are injected beneath the conjunctiva in the neighborhood of the nodule, the conjunctiva having

first been cocainized, the injection to be repeated as soon as the reaction has subsided, usually in three or four days. The speaker has seen some wonderful and rapid results follow the use of this method, one case in particular being relieved after one and cured after three injections, after various other means of treatment had been employed for several months; but he has also had some disappointing results.

Recent reports seem to show that it is not altogether the mercury that causes the improvement in the cases in which these injections have been made beneath the conjunctiva. Injections of distilled water alone have given some equally good results. Inasmuch, however, as distilled water injected beneath the conjunctiva causes considerable pain, a solution of sodium chloride has been employed—about a two-tenths of one per cent. solution. My own experience with the latter method is too limited to enable me to speak for or against it. Further clinical investigation will have to determine the comparative value of each.

After the acute inflammatory symptoms have subsided, if the absorption of the nodule seems to be too slow the process may be hastened by massage through the closed lid either with or without the yellow-oxide-of-mercury ointment.

In all cases it is understood that the patient must be placed in a proper hygienic condition, and that any errors of refraction or any muscular insufficiencies must be properly corrected.

Sometimes, in spite of all the treatment we can institute—and we are occasionally obliged to go through the whole long list—the duration of the disease seems to be unmodified, extending over a period of months, or even years.

47 North Seventeenth Street.

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*THE ROLE OF FEVER IN THE MODIFICATION OF DISEASE.**

By H. A. Hare, M.D.,
Professor of Therapeutics in the Jefferson Medical College of Philadelphia.

When Dr. Foster asked me to be your guest this evening, I accepted the honor as one which was a pleasure in its conception, in its prospect, and, I now find, in its existence.

I shall not consume all the time of my address with a single line of thought, but consider three topics which I believe are of interest to us all. The first of these is, the rôle played by fever in the modification of disease, when it is due to an infection by germs or a poison; the second is, the reason why antipyretic drugs do harm; and the third, the rational explanation of the good results obtained by cold bathing.

One of the most extraordinary facts in connection with practical medicine is the rapidity with which certain views in regard to pathology and treatment change, and perhaps no better evidence of this can be found than the subject of which I shall speak tonight. As long ago as the time of Hippocrates that individual expressed the belief that fever was a protective process, and many others more or less remote from our times have endorsed this view, so that we find the professional mind first regarding the fever as salutary, then as an annoying symptom, then as a symptom to be regretted, and very recently as a symptom to be controlled as a crying evil.

Notwithstanding the fact that the usefulness of fever has been recognized in the past, it is my intention to bring forward additional evidence in support of this view and against the view that fever is harmful; or, in other words, to show, by the introduction of the newer evidence produced in recent years by bacteriological and other research, that fever is not an unmitigated evil, and that when we reduce fever by the use of drugs we not only remove a symptom but deprive the body of a therapeutic measure devised by nature for the protection of the individual.

It is scarcely a few months since a majority of us were endeavoring with a praiseworthy ardor to reduce all fever by the use of antipyretic drugs, and it is interesting to note how the profession gradually became more and more impressed with the importance of antipyresis until finally it was swept off its feet by the rising wave of what might be called febriphobia, and then was kept off its feet by the assistance of those persons whose pecuniary interests lay in drugs which reduced fever.

Let us first discover whether fever is a harmful process, and after that decide as to whether it is salutary. Like almost every question in medicine, this one is readily decided upon facts lying between two extremes of theory. There is an immense amount of evidence to show that fever is harmful and

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*Address read at the second annual meeting of the Allegheny County Medical Society, at Pittsburgh, Pa., January 30, 1896.

causes great changes in certain organs if the temperature really becomes very high, say as high as 108° to 110°; but there is almost no evidence that it is harmful below this point, it having been proved that much if not all the morbid changes in structure thought to be due to the fever are really produced by the germs of the disease or their toxins, even if no rise of temperature has occurred. To assert, on the other hand, that fever is always innocuous or always useful, is distinctly wrong, from the standpoint of common sense no less than from that of practical laboratory and clinical experience.

The experiments of Welch and Naunyn show that animals can bear temperatures, artificially induced, which far exceed the normal, if only there be no additional strain thrown upon the organism by an infectious process; and Welch points out that there is clinical evidence in support of this in several conditions, notably relapsing fever. I would also call attention to the fact that in cases of thermic fever which do not reach excessive heights, secondary changes due to the fever occur very rarely if at all.

Having found that fever in fairly moderate degree is not harmful, we can progress to the demonstration of the fact that it is useful—a step forward which brings us in antagonism with the general trend of thought among practicing physicians, but which is more favorably looked upon by laboratory pathologists, provided an infectious process be present as the cause of the pyrexia.

The belief that fever is a protective against infection seems sanctioned by the following facts: *First*, fever is a condition developing in all healthy animals as soon as they undertake, as do all healthy animals, to resist infection; and while it may be urged that it is a coincident symptom alone, this hardly seems probable in view of its importance—that is to say, Nature would hardly devise a plan for vital resistance handicapped by such an important phenomenon if it were useless in itself. *Second*, animals which receive sufficiently large doses of germs or their toxins to cause death, beyond all doubt often develop very little fever or none at all, or, in other words, are so overwhelmed that resisting methods cannot be developed by the body. This is proved by clinical experience and the researches of Gamaleia* and others. *Third*, animals which receive smaller doses speedily develop fever and survive, but if the same dose be given and fever be prevented by artificial means they die as promptly as if large doses were used. *Fourth*, when an animal is immunized by repeated doses of toxic material, it has a febrile movement with each effort to develop antitoxin until it is completely immune, the fever being greatest in the most susceptible subject, decreasing with each infection as the animal's tissues find it less necessary to manufacture at short notice large amounts of antitoxin.

The first two propositions are so well founded as to need no citations to confirm them. In regard to the third I may quote the experiments of Loewy and Richter,* who found that if fever was produced by the Sachs-Aronsohn method of puncture of the corpus striatum, infection by the Klebs-Loeffler bacillus, the pneumococcus, the coccus of erysipelas, and the micro-organism of chicken-cholera, when the temperature of the body was 106° F. or thereabout, failed to cause death as soon as usual, even though 100 times the ordinary fatal dose was injected. Again, these investigators found that when three times the fatal dose of pneumococcus was injected, the animals with the highest temperature survived, and if swine-plague was injected the course of the disease was slower than usual if fever was present.

Having shown, then, that fever is a protective process, we can adduce evidence that its absence prevents the system of the animal infected from resisting with success the onslaught of its enemies. In this connection much evidence might be adduced, for we know that anything which lowers temperature decreases vital activity, but I shall confine myself to the more recent experiments bearing directly upon the effects of reduced temperature upon infective processes. Thus in the studies of Wagner† this author found that when chickens were infected by anthrax bacilli their temperature rose several degrees Fahrenheit and remained so for several days, and at the end of that time no bacilli could be found in their tissues, whereas if the chickens were kept cool by the partial immersion of their bodies in water they all promptly died and the symptoms of anthrax infection were typical. Similar results also ensued when the temperature was reduced by antipyrin, and the author goes on to state that five out of six of the infected chickens died. Ruffer has pointed out as a result of

* *Annales de l'Institut Pasteur*, 1888, No. 5, p. 229.

* *Deutsche Med. Woch.*, April 11, 1895, p. 240.

† *Centralblatt für Bakt. und Parasit.*, 1891, p. 322.

his experiments that "the struggle between micro-organisms and the animal cells is a physiological process always going on in the tonsils and Peyer's patches, the microphages and macrophages being victorious in the healthy animal. If these structures are weakened from any cause—*e. g.* over-fatigue, cold, nervous shock,—a local disease follows the multiplication of micro-organisms in the tonsils. An increased emigration of phagocytes may limit the process to the tonsils even then, or the micro-organisms may break through the barrier of these cells, invade the animal's body, and the disease become general."

Without going fully into the experiments made by Pasteur, Nocard and Roux, Platania, Canalis and Morpurgo, Arloing, Charrin and Ruffer, Roger and Herman, it may be mentioned that Charrin and Roger have proved that white rats, which, as a rule, are immune against anthrax, take the disease readily when the animals suffer from muscular overexertion; and Bouchard has shown that "when a healthy animal is exposed to the influence of cold for a considerable time, the micro-organisms readily pass from the alimentary canal and lungs into the blood; whilst the influence of hunger as a predisposing factor has been ably studied by Italian observers. The exhaustion produced by fever, want of food, etc., during the course of an infectious disease, must necessarily help the microbes of suppuration in their endeavors to penetrate into the internal organs." Pasteur also records the fact that chickens infected by anthrax survive, but if cooled they promptly succumb. Rorighi also found that if guinea-pigs were cooled they resisted infection very badly, whereas if the fever persisted they survived longer or recovered. He reached similar results with pigeons. Walther reached similar results with the Fraenkel pneumococcus.* In other words, everything which tends to lower bodily temperature increases the susceptibility to disease of an infectious nature.

The dominant tendency of all lethal poisons is to cause a fall of bodily temperature, and the effort of nature is to combat this by an increase in heat-production. The well known experiments of Brunton showed, for example, that the maintenance of bodily heat saved the lives of animals otherwise fatally poisoned by chloral, and we have just adduced evidence, not only that a rise of temperature saves life in an infectious poisoning, but that a loss of temperature aids in the fatal result.

In support of the fourth proposition we have the well known studies of many experimenters as to the production of immunity by the development of antitoxin.

The studies of the Klemperers in connection with pneumonia are in this connection most interesting, for by the injection of the products of the *Micrococcus lanceolatus* into animals they were able to render the animals immune to infection by the organisms themselves, although these organisms continued present in an unchanged form as numerous as ever. In other words, they caused a development of antitoxin in the tissues, which enabled the animals to resist the toxin of the germs. More important than this, however, is the fact that the immunizing power of the toxin was found to be very much increased when the latter was subjected to a temperature higher than the normal temperature of the animal, before being injected. Thus, if heated to about 106° F. for some time previous to injection, the development of immunity was much more rapidly produced than when cooler injections were made, immunity being reached in a few days in one case and not for fourteen days in the other, and then only after large amounts had been given. Further than this, if previously heated toxin is introduced into the circulation, the systemic reaction is slight, whereas if the toxin is not heated the systemic reaction is far greater.

The Klemperers think, and it seems to me with good reason, that the object of this high fever following immunizing injections is to produce similar effects to those obtained by heating the toxin before injection—or, in other words, that fever in some way aids the body in acquiring immunity by the formation of antitoxin; and this is proved by the fact that days are required for the production of immunity by toxin injections, but instant immunity is attained if serum from an already immunized animal be injected, for in it the antitoxin is already present. The Klemperers assert that the development of crisis in croupous pneumonia occurs at the time when the body has produced sufficient antitoxin to antidote the toxin, and if fever has no connection with the process of immunization it is curious that the fall of temperature and completion of the immunizing process should occur simultaneously. It is also interesting to note that croupous pneumonia, while it

* For an interesting paper on this topic, see Max Müller, *Zeitschrift für Hygiene und Infectionskrankheiten*, bd. xx, heft ii, August, 1895, p. 245.

usually has its crisis about the eighth or ninth day, may have it as early as the third or fourth. In other words, the individual attacked develops immunity by the making of antitoxin so rapidly that the poison of the disease is antidoted by the fourth day.

Neither the fever, the toxin nor the antitoxin has, however, much effect upon the infecting power of the germ of pneumonia, for that germ is found in some cases in equal numbers and as well developed after an attack of pneumonia as it was at the beginning, and remains so in the lungs for a long time, although Pipping* asserts that high fever changes the form of the micrococcus and renders its development more slow. This resistance is not true of all germs causing disease, for, as Gamaleia has pointed out, in anthrax-infection destruction of the bacilli can be found going on in the subcutaneous tissues at the point of infection, in the lymphatic glands, bone-marrow, and spleen, during the febrile period. This destruction is not due to leucocytosis.

As a result of this summary of the subject, I think we can affirm that fever does aid in the production of immunity, and that this is probably due to the increased rapidity of the vital processes produced by the rise of bodily temperature. In other words, the functional activity of all the organs and tissues being increased, the various methods adopted by Nature for the protection of the body against infection are stimulated to the utmost. These functions exist in several parts, and it is generally recognized to-day that in the presence of infection one or all of these several protective processes are carried out in the body. In the first place, the emunctories relieve the patient's system by eliminating toxic materials; second, the glandular system protects the body from these poisons by oxidation and by the development of leucocytes whereby in turn phagocytosis is developed and antitoxin formed, and, finally, fever is produced, which there is every reason to believe is either distinctly detrimental to the germs or their toxin or so stimulant to the tissues or glands that antitoxin is more freely manufactured.

It is not necessary to dilate upon the importance of the emunctories such as the skin, kidneys, and bowels, in excreting effete materials from the body. Every one of us knows that if we can keep these parts active during an infectious disease, as, for example, scarlet fever, we will have recovery as the probable result, and we also know that just so soon as they become inactive grave symptoms arise.

The well known experiments of Schiff and Lautenbach have shown that the ability of the glandular apparatus, particularly the liver, to destroy poisons, is extraordinary; and this ability depends upon the blood-supply and vascularity of the gland, for it was also found by them that the mere passage of the poison through a large capillary network greatly reduced its toxic power by oxidation. Thus the liver, when unimpaired in function, destroys large amounts of poison which, but for this gland, would speedily cause death. Even in so low an animal as the frog these experimenters found that doses of nicotine which were without great effect in the intact animal caused death at once if the circulation of the liver were tied off or this gland removed; and we all know clinically that just so soon as the function of this gland is impaired by congestion, inflammation, or other disease (like cirrhosis), there develops a train of symptoms commonly called biliousness, or in its severe forms something worse, which is typically a condition of toxemia even to disturbances of vision, dilated pupils, fever, and collapse. Increased glandular activity all over the body means, therefore, two important changes—first, an increased blood-supply to the gland, that is, an increased capillary circulation with consequent increase in the oxidizing power of the part; and second, an increase in bodily heat due to the glandular activity, for we know that increased oxidation means increased heat, and that the bodily heat is largely maintained by this means. It seems hard to imagine that Nature would develop so good a method for destroying poisons, only to develop simultaneously an evil in the shape of fever; and the fever, as we have pointed out, is not a mere symptom or by-product of the process, but a distinct aid to the organism,—not simply a result of vital activity, but the most powerful stimulant to every part of the body, and most notably to the heart, which in turn beats more rapidly and forcibly and so increases the blood-supply to the tissues which are needing an increased amount of oxygen and nourishment in performing their increased duties.

The glands of the body not only act in the way just described, but in addition they develop leucocytes, which possess the power in many cases of destroying the germs of disease by phagocytosis, or by aiding in some as yet

**Fortschritte der Medicin*, 1886, No. 14, p. 449.

unknown way in the formation of antitoxin. The theory of phagocytosis is one of the most attractive of all those advanced by bacteriologists, notably by Metchnikoff. It will be remembered that the growth of infecting micro-organisms is at once arrested by their ingestion and digestion, so to speak, by the leucocytes which surround them, just as an amœba surrounds a diatom. The number of leucocytes as compared to the number of infecting germs is as important as the number of soldiers in an army, and the part which can bring a great array of leucocytes against the invaders is with difficulty infected, unless there be injected simultaneously with the germs some irritant or poison which destroys the leucocytes and gives the germs time to become too invincible by multiplication and the development of their own poison which protects them from the leucocytes. Thus it has been found, by Metschnikoff, Ruffer, and others, that if infecting germs be placed under the skin of a rabbit, no infection ensues if the leucocytes can attack and destroy them; but if the smallest possible infecting dose be given by inserting beneath the skin germs protected by bibulous paper from the leucocytes, the animal ultimately dies because the nutritive juices passed through to the germ and its poisons pass out readily, but the leucocytes cannot get at the germ itself.

A further discussion of the facts for and against phagocytosis is not necessary, but we cannot overlook the important fact that in nearly every infection there is an enormous development of leucocytes, and that in cases of such malignancy that death speedily occurs we find no increase in leucocytes, either because they are vanquished by the overwhelming army of invasion, or because the system has had no time to carry out leucocytosis. So true is this that in that typically infectious malady called croupous pneumonia, one of the surest signs of a malignant attack is the lack of an increase in leucocytosis. Increased leucocytosis is therefore a much-to-be desired result; and as fever causes as well as results from increased glandular activity, it may stimulate the development of leucocytosis and aid in destroying the infection.

That fever does aid in the production of leucocytosis *per se* is, however, a matter of doubt, and the experiments of Carter of Philadelphia and of other investigators, such as Rorighi and Ischlenoff, seem to indicate that there is no relationship between a pure rise of temperature and leucocytosis—that is to say, artificially produced fever does not increase the number of leucocytes in the blood,—but if certain infections are present, their increase becomes extraordinary. From these facts the conclusion has been reached that fever and increased leucocytosis are coincident and do not bear the relation of cause and effect. On the other hand it is equally true that in some conditions leucocytosis ceases the moment the temperature of the patient falls to the normal. Thus, in pneumonia, leucocytosis ceases with the crisis—which result may be due to other causes, of course, than the fall in temperature. Taking it all in all, therefore, we must conclude that whatever value fever may have in infectious diseases, it does not do good always by aiding leucocytosis, if these experiments can be relied upon.

Many years ago it was the effort of physicians to reduce fevers by diaphoresis and diuresis, and they often succeeded in aborting febrile movement or aiding in its arrest or fall by measures too often to-day considered homely and useless. The fact remains, however, that whether they succeeded or not in relieving fever, they did no harm, and if the fever was severe enough to resist their measures the patient remained equally able to resist the onset of the infection producing it. The trouble, if preventable, was set aside; and if not, its true course and the object of its existence were not masked by powerful drugs. Further than this, two admirable results were attained, namely, that the skin and kidneys were flushed, cleansed, and made ready for the task of eliminating materials which we call to-day "toxins," and any poisonous material already formed in the tissues or bowels was gotten rid of. Unfortunately for the profession, it was discovered that digitalis sometimes reduced fever, and, as this symptom was often the most manifest and annoying, this drug began to be used for the reduction of temperature, and with it quinine began to take a valued place on account of its antipyretic and specific effect in malarial fevers. It was the fact that quinine was futile during the early stages of all fever not malarial that roused the desire for something more active, and the nearness of the period of ridiculous fear of exposure to cold in fevers excluded cold applications from the therapy of such cases. As a result salicylic acid was employed, and from this it was but a step to the common antipyretics of to-day.

There is, however, abundant evidence to

show that the older methods of reducing fever in mild infectious cases by the production of sweating and increased glandular secretion all over the body had a far more rational basis than has the employment of antipyretic drugs, and that fevers which they failed to abort ran their course in many cases to the distinct benefit of the patient; further, that antipyretic drugs in reducing fever decrease the vital resistance of the patient, and that the use of the cold bath or cold sponging as employed to-day does not do good by the reduction of temperature so much as by increasing glandular and other vital activities.

Bearing in mind the four methods of Nature just named, for the protection of the body—namely, elimination of poison by the emunctories, the development of antitoxin by the glands and other tissues, the production of fever to stimulate and support the system and as a result the increased functional activity, and the development of leucocytosis—we can now go still further and show that the use of antipyretic measures is only to be resorted to in cases where the fever is excessive, and that, if employed, only those are to be used which reduce the fever moderately and either increase the ability of the system to antagonize the infection or at least do not hinder it from doing so. For these last reasons I believe that antipyretic drugs should very rarely be used for the purpose of reducing fever, for they not only remove fever, but at the same time depress the nervous centres governing heat-production, and increase the work of the emunctories already loaded down by the poison brought to them for elimination; and, more important than all to those who believe in phagocytosis, they arrest the development of leucocytosis and thereby remove one of the means of destroying the germs of disease (according to one theory), or of developing antitoxin (according to another). I am well aware that there is contradictory evidence in regard to the view that coal-tar products inhibit leucocytosis, but I believe that any evidence against my statement can be set aside in view of the fact that moderate variations in the number of leucocytes take place with or without the effect of drugs or infection. Further than this, we have already quoted authority showing that the use of antipyretic drugs increases the fatal tendency of an infection.

The studies of Jacubowitsch, Müller and others prove very conclusively that antipyrin at least greatly decreases the elimination of urea by the urine, and the first-named writer vehemently condemns its use for this reason. It also decreases urinary flow, which is a distinctly harmful effect when we wish the excretion of effete materials from the body. Again, antipyrin tends to interfere with the poison-destroying function of the liver by congesting it, for, as pointed out by Baruch, the weight of the liver after death from infectious disease treated by antipyretics is found to be ten to twelve grammes heavier than in those dying of typhoid fever treated by cold baths. Porter asserts that these antipyretics in the presence of fever may cause granular and fatty degeneration in the kidney and liver.

These experimental facts seem well founded upon clinical results, for under this method of treatment the mortality of infectious diseases has been as high or higher than when antipyretics, as we call them, were practically unknown; the death-rate from typhoid fever, for example, under antipyrin or similar treatment, being about twenty-five per cent., while in cases treated by the cold bath it is from one to five per cent. as a rule.

The natural thought is that if antipyresis is harmful when obtained by drugs, it is also harmful when obtained by cold baths. Yet clinical results prove the contrary. The fact that cold bathing does decrease the mortality of typhoid in the general run of cases is established, and it is not credible that the mere abstraction of heat can influence the progress of so grave a disease. I have long felt that the cold bath did more than abstract heat, and I venture to advance the idea that it does so by permitting the tissues to destroy the poison of the disease by oxidation or allied processes. By the use of antipyretic drugs we prevent fever by decreasing the production of heat, and thereby inhibit oxidation processes in those tissues which develop the most heat and destroy the greater part of the infecting poison, be it microbic or a toxin from the growth of germs. That is, we prevent the body from performing the protective work which it would do under the sole guidance of Nature. On the other hand, if the bath be employed, we actually increase the temperature of the internal organs, as shown by Liebermeister,* who found that the internal temperature of the body was raised by the use of cold externally, and the more the cold the greater the rise. Foster also points out that when the naked body is ex-

* Handbuch der Pathol. und Therapie des Fiebers, p. 102.

posed to cold for a short time the internal temperature rises. The reason of this seems to be that the blood seeks the centres, and the central organs immediately produce more heat to make up for the loss at the periphery. Therefore the cold bath really increases the destruction of toxin, if I am right in believing that heat does aid in combating infection. The cold bath abstracts heat only, and if used in moderation, as it is when properly employed, in all fevers actually increases bodily metabolism or tissue-interchange, and consequently acts in much the same manner that an increased draught increases and makes more perfect the combustion of coal in a stove.

Liebermeister, Röhrig and Zuntz have also shown that the use of cold applied externally increases oxidation in the body so that a larger amount of oxygen is taken up and more CO_2 eliminated; and the experiments of Thermes show that cold bathing increases the number of the blood-corpuscles and the amount of their hemoglobin. Winternitz has confirmed this observation.

The differences in the effect of the antipyretic drug and the bath are notable. Thus, if we consider the body as a stove, and the tissues producing heat as the coal, and the coal to be mixed with impurities which can only be destroyed by oxidation, we can illustrate the effects of antipyretic drugs and baths very well. The object is to prevent the stove from being injured by overheating, and yet to destroy the poisons in the coal by heat. If the fire in the coal is smothered by antipyretics, so that less heat is produced, the stove (or the body) is in no danger of injury by heat, but the impurities mixed with the coal are also left intact and do injury; whereas if the coal is allowed to actively burn, and the stove kept moderately cool by the use of water or ice placed around it, the impurities are destroyed, and the usefulness of fever is attained without damage from excessive heat.

Elaborate clinical studies in hydrotherapy in fevers and other diseases not associated with fever show that the cold bath also stimulates glandular activity and leucocytosis, improves the tone of the circulation and nervous system, and increases vital activity everywhere, and that it also increases the urinary flow and the quantity of solids in the urine. Thus, Winternitz has shown in one of his recent papers that all applications of cold to the entire surface greatly increase the number of leucocytes and the percentage of hemoglobin; and Thayer of Baltimore has confirmed these observations—finding in typhoid fever, for example, that the number of leucocytes was increased from two- to nearly four-fold.

The question which naturally arises at this point is, whether there is an actual increase in the number of leucocytes produced by the cold bath, or whether they are gathered from various areas of blood-cell production and sent out into circulation. Some unfinished studies of Thayer would seem to bear out the latter view, and this is what we certainly expect to be the case. In either event we can rest assured that the drawing of these cells into the active circulation does good, whether we believe in the theory of leucocytosis as a protective process or not, for inactive non-circulating leucocytes are of little more value than none at all.

Jaquet, of Basle, finds that the number of blood-corpuscles is often considerably diminished in fever, but after a bath of ten minutes' duration at 27° C., in most cases, one observes an increase of blood-corpuscles to the extent of 500,000 per cubic millimeter. In health a cold bath has the same effect, but to a less extent. Antipyrin has no such action, even when given to the extent of sixty centigrammes. Jaquet produced in rabbits an artificial hyperthermia by keeping them at a uniform temperature of 37° for twenty-four to thirty-six hours, until their temperature reached 40°–42° C. Blood drawn from the ear showed a considerable diminution in its red corpuscles, while on the contrary there was a decided increase in the corpuscles of the liver. It would seem, therefore, that in fever the corpuscles accumulate in those organs where the circulation is slowest, *e. g.* the liver, and the cold bath acts like a tonic on the circulation and tends to get rid of this globular stasis, thus favoring the general circulation.

In my Text-book of Practical Therapeutics, the first edition of which appeared about five years ago, I said in regard to this effect of cold on the circulation: "On entering the water he (the patient) shivers, thinks it almost unbearably cold, his teeth chatter, and he gasps if the cold suddenly touches the belly-wall or any exposed surface. In a moment, however, reaction sets in, and the extremities, heretofore blue, trembling, and covered with cutis anserina, become warmer and flushed. The pulse is increased in force and frequency, and the respirations are deeper and more thoroughly performed. As a result

of this, each portion of the body receives a more perfect supply of blood and feels rejuvenated. Following this stage of exhilaration a third comes on in which the blueness and depression of the first stage recur in an exaggerated degree, but this condition does not ensue unless the person remains too long in the water. If he leaves the bath while in the acme of his exhilaration, the stimulus may remain with him throughout the rest of the day."

The reason for the occurrence of this train of symptoms, is not far to seek. The chilliness of the first stage shows that the great abstraction of heat is lowering the bodily temperature, the centres for calorification in the body not manufacturing all the heat that is needed for the preservation of the normal temperature. At first the cold drives the blood hurrying into the warm recesses of the body, leaving the surface cold; but in a few moments the system is aroused to the recognition of the fact that it must increase its exertions in the propulsion of blood and the manufacture of heat, and so with an effort it puts forth all its power, picks up each corpuscle that is hiding from the cold in the internal organs, and, after imbuing it with warmth obtained by increased heat-production in the sources of heat-manufacture, forces it out to the surface of the body along with its fellows, which are driven to all parts of the system. This is not a mere figurative way of putting the matter, for cold always contracts blood-vessels and reflexly stimulates the vital centres to increased activity.

The cold bath, therefore, has a physiological action far more important than the withdrawal of heat, this being a minor and side issue, and it really puts the system in the best trim to resist disease. Only when used for a protracted period of time in such a way that it abstracts more heat than the body can make, does it really reduce the temperature of the entire body.

My views in regard to these questions may therefore be summed up as follows:

First: Moderate fever has been proved to be in itself harmless. Hyperpyrexia is of itself harmful.

Second: Moderate fever has a useful function to perform in the body in the presence of an infection.

Third: Cold baths do good, not by the mere abstraction of heat, but by increasing metabolism and the rapidity of all vital processes.

Fourth: The use of antipyretic drugs is contra-indicated in all infectious diseases. Five years ago, when their use was far more popular than it is to-day, and before we knew as much of their effects and the development of immunity by antitoxin, I said in an essay on "Fever and Antiseptics" to which was awarded the Boylston Prize of Harvard University:

"While it is true that antipyrin may be employed in any disease associated with high temperature, such as typhoid fever, pneumonia, or erysipelas, it must not be forgotten that but one object is gained by its use. Antipyrin, even though its influence may be most favorable in a given case, still accomplishes nothing in the way of cure. Antipyrin only governs the heat processes while the disease plows its way onward to recovery or death; although it may, by quieting restlessness due to the fever or to the nervous disorder produced by the disease, render the pathway to recovery more easy, but no shorter than if it were not employed.

"Many physicians have looked and still look upon antipyretic treatment as curative in its effects, but nothing can be more distant from the truth. It should be distinctly understood and taught everywhere that these drugs belong to a peculiar class; a class of drugs to which we gladly turn when told 'to treat the symptoms as they arise;' a class of drugs which are to be used solely for the relief of the symptoms, and not for the cure of the disease."

These views I still hold, and I think that those best qualified to judge will give them their endorsement.

CHLOROSAL IN THE TREATMENT OF DIARRHEA.

The *Revue Illustree de Polytechnique Médicale* for October 31 remarks that this is the name of a new drug which is a salicylic derivative of chlorophenol. Two isomeric combinations are known, orthochlorosalol and parachlorosalol. These are crystalline substances, white, insoluble in water, and soluble in alcohol and ether. The former has a rather strong odor, while the latter is tasteless and odorless. Girard administers it with success in amounts of from thirty to sixty grains a day in catarrhal affections of the urinary tract and in cases of diarrhea. It may also be used to powder certain kinds of wounds, as it has the advantage of not producing any local irritation.—*New York Medical Journal*, Dec. 14, 1895.

The Therapeutic Gazette

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Leading Articles.

SPECIAL CORRESPONDENCE.

The Editor is glad to announce that arrangements have been completed and are now in effect which will provide the Correspondence Columns of the GAZETTE with interesting foreign letters from the great medical centres. The gentlemen who have consented to keep the readers of the GAZETTE posted as to medical matters in London, Paris, Manchester, Berlin, Vienna, Edinburgh, and other cities, are well known as able contributors to current medical literature, and occupy positions in the profession which put them in touch with the facts which are most interesting to their professional brethren in America and elsewhere.

By this means, added to the Original Articles, the Editorials, the Notes on Therapeutic Progress, the Reviews, and the Notes and Queries, subscribers to the THERAPEUTIC GAZETTE have the latest and best medical information brought before them every month in a form suitable for practical application.

THE TREATMENT OF GALL-STONES.

In the January issue of the THERAPEUTIC GAZETTE we spoke of the treatment of gall-stones from the standpoint of preventive medicine, and it may not be out of place to consider in this number the treatment of the patient suffering acutely from their presence. Before doing so, however, it is well to remember that the pain felt in the right hypochondrium may be due to the presence of a renal and not an hepatic calculus, and that the distribution and character of the pain may in some instances so closely resemble hepatic trouble as to cause a faulty diagnosis. Again, it is well to preface a consideration of the treatment of gall-stone colic by the recollection that the opening of the common duct into the intestine is guarded by a sphincter-like arrangement which prevents the ingress of the intestinal contents, and, in the case of a stone being passed, tends to prevent its slipping out into the bowel. Again, it is not to be forgotten that there is usually present not only a markedly catarrhal state of the biliary mucous membrane, but often patches of ulceration, from which general infection or perforation may ensue. Finally, the presence of severe pain and tympanites following upon the constipation, so often present in these cases, renders any movement of the bowel difficult or impossible.

The therapeutic indications are, therefore: the relaxation of the sphincter which is in spasm and guards the opening through which the stone must pass; to aid in the expulsion of the stone by the removal of mucus and the congestion in the inflamed mucous membrane; and to relieve tympanites and constipation, not to speak of the pain.

We have already urged elsewhere the free use of spirit of chloroform for the relief of abdominal pain and for relaxing muscular fibres which may be gripping the stone, and we wish to emphasize the importance of this use of this preparation by pointing out that it tends to stop vomiting, relieves tympanites, and acts as an intestinal antiseptic. Along with the chloroform spirit may be given full doses of tincture of belladonna by the mouth, or atropine hypodermically, and the patient should be placed in as hot a bath as he can stand until a large injection has been prepared for the purpose of washing out the rectum and colon. The question as to whether morphine should be used, hypodermically or by the mouth, in such cases, will, we think, be usually answered in the affirmative by the practitioner of experience, on the ground that it is necessary for the relief of the excessive pain and for the purpose of relaxing spasm. On the other hand, it has been pointed out by experienced physicians that very full

doses of morphine may cause such complete relaxation that, while the pain is removed, the stone is not expelled, but remains *in situ*, ready to cause ulceration, obstruction, and another attack of colic. Moderate doses of opium or morphine are, therefore, to be counseled. Indeed, it is asserted that it is only to be given when the patient is exhausted, and if used then, to be given in large enough single dose to be unfailingly effective. Probably the best plan for relieving the pain is to use chloroform or ether by inhalation to the point of primary anesthesia, or, in other words, just enough to take the edge off the pain without stopping the expulsive efforts,—a process daily resorted to in cases of parturition.

The question as to whether emetics are to be used in these cases, in order to aid in producing muscular relaxation which will result in the release of the stone, is to be answered in the negative, since the vomiting may cause rupture of the gall-bladder if this viscus is distended by stones or bile.

The sudden relief of pain points to the escape of the stone into the intestine, and a dose of castor oil should be given at once to sweep it out for examination. If the pain gradually declines, it points rather to a subsidence of effort without expulsion, and as soon as the patient recovers the question of operative interference is to be seriously considered, particularly if the attacks have been frequent and the patient's health is suffering.

That the question of operation for gall-stone is not as serious as many suppose, is shown by the fact that about ninety-five per cent. of cholecystotomies for gall-stone recover; Mayo Robson states that in his hands it is even better than this, for of forty-four cases all got well. On the other hand, the operation is undeniably a difficult one, may be followed by more or less general peritoneal inflammation, and is often found to be more hazardous than at first supposed by reason of the presence of large inflammatory exudates due to chronic inflammation about the gall-bladder or ducts.

In conclusion, it may not be out of place to append Mr. Robson's conclusions as to the indications for surgical interference in gall-stone troubles, as they appeared in the *Clinical Journal:*

1. Repeated attacks of biliary colic which, not yielding to medical treatment, are wearing out the patient's strength.

2. Suppuration in the neighborhood of the gall-bladder, as in empyema of the gall-bladder, or in abscess of the liver, associated with gall-stones.

3. Dropsy of the gall-bladder.

4. Obstructive jaundice where there is reason to think that the common duct is occluded by gall-stones.

5. Acute peritonitis starting in the region of the gall-bladder, where the previous history of the patient is suggestive of gall-stones.

6. Intestinal obstruction due to occlusion by a large biliary concretion.

THE USE OF OXYGEN GAS DURING SURGICAL ANESTHESIA.

The two conditions which, while not alarming, are, nevertheless, annoying to the surgeon, which ensue when ether is administered as an anesthetic, are cyanosis and nausea, and vomiting when the patient regains consciousness. In some instances this nausea and vomiting are so intense as to cause the patient far more suffering and physical injury than the operation itself, and any therapeutic method which can put aside this disagreeable concomitant or after-symptom will be highly valued by practical physicians. While the administration of oxygen during or after anesthesia produced by ether and chloroform is by no means a new therapeutic invention, it has recently been prominently brought forward, first, by the interesting correspondence of Dr. Theophilus Parvin, in which he has described his experiences during a visit to Landau's clinic; and, second, by the paper of Dr. C. B. Cole in the *New York Medical Record* of October 12, 1895. Dr. Parvin tells us, in a personal interview, that the practical results following the administration of oxygen gas in the convalescence from operations was to him most impressive of its value; that the patients recovered consciousness more speedily than under ordinary circumstances, and that to many if not all of them subsequent nausea and vomiting were unknown. In the paper of Dr. Cole, which he publishes as somewhat of a preliminary communication, an interesting account is given of several cases in which the administration of oxygen and ether in the mask acted exceedingly well in preventing the cyanosis and interference with respiration so frequently seen during anesthetization. We can, therefore, bring the matter before the readers of the GAZETTE with some confidence that the advantages which would theoretically follow the administration of this

gas during anesthesia are found to be present in practical experience, and the harmlessness of the method, combined with its efficiency, seems to us to recommend it highly to those who have the best opportunities for testing its value.

THE ERUPTIONS PRODUCED BY DRUGS.

Although every dermatologist recognizes the frequency with which various forms of skin-eruptions appear after the administration of many medicines, it is probably true that the average practitioner does not pay sufficient attention to this possibility, and is therefore misled in some cases into making a diagnosis of one of the exanthemata or of deciding that the eruption is a typical disease of the skin. It is impossible, in the short space which can be devoted to a leading article, to go over in detail all of the drugs capable of producing such untoward effects. On considering the most prominent of them, it can be laid down as a safe rule that a diagnosis of a skin-disease ought never to be made with positiveness until the possibility of the lesion being produced by a drug has been entirely put aside. Only recently one of the most prominent dermatologists in this country said to the writer that it was surprising how many cases were sent to him by physicians who were not specialists in diseases of the skin, on the supposition that the individual was suffering from some true skin-disease, when, in reality, the withdrawal of the medicine which the patient was taking for some other complaint was speedily followed by complete recovery. Of all the drugs which may produce lesions in the skin which closely resemble forms of true skin-disease, iodide of potassium ranks first. Urticarial wheals, bullous eruptions, and even eczematous catches may follow its administration, while in other cases an intense pruritus develops, which is thought to be due, perhaps, to the gout from which the patient is suffering rather than to the drug. Singularly enough, quinine is another drug which produces eruptions more frequently than is generally recognized, perhaps the most common form of eruption being urticaria, or in its place an intense erythema. The eruption of quinine and belladonna may so closely resemble that of scarlet fever as to make a diagnosis between the two conditions very difficult, particularly as the belladonna is very apt to cause a slight rise of temperature. Antipyrin may also produce such a rash, though it more commonly resembles the eruption of measles; and salicylic acid may, as may also iodide of potassium, cause localized edema; while arsenic causes pigmentation of the skin. The subsequent course of the case, and the fact that these eruptions are generally uncomplicated by other symptoms, will do much towards enabling the physician to guard himself against deception, provided he will but remember the possibility of skin-changes under the use of remedies.

TREATMENT OF SURGICAL TUBERCULOSIS BY MEANS OF IODOFORM INJECTIONS.

Since Mikulicz prominently brought before the profession the anti-tubercular action of iodoform when brought in direct contact with diseased foci, the literature of surgery has furnished countless reports corroborating the findings of this surgeon and showing results so satisfactory that in recent years the percentage of arthrectomies, of excisions and of formal major operations undertaken for the relief of surgical tuberculosis in bones and joints has markedly diminished.

The iodoform treatment—that is, local injections of iodoform-containing fluids into tuberculous tissues—has in the main been used only in exceptional cases, and not as a protracted routine treatment. Indeed, the majority of all reports are open to the objection that a sufficient number of cases has not been observed by individual operators, or that the treatment has not been continued through a sufficiently long time, or, still more important, that the ultimate results are not recorded.

Wieland's records of the results obtained in the Children's Hospital at Basle are, therefore, of more than usual value, since he has been employing this treatment as his routine method since 1891, has observed many of the patients for a number of years, and in a fair percentage of his cases is able to report the ultimate results (*Deutsche Zeitschrift für Chirurgie*, bd. xli, heft 4 and 5). During this time there were thus treated twenty-one cases of cold abscess, including many psoas abscesses; of these, sixteen were definitely healed, four were improved, and one showed no improvement. Of twelve cases of joint tuberculosis treated by iodoform injections, nine were cured and three were improved. Of twenty-eight cases of surgical tuberculosis first treated operatively—*i. e.*, by incision and curetting—and afterwards by iodoform injections,

twenty-five were cured, two improved, and one died; of these last cases, together with affections of the larger joints, four were para-articular abscesses, six diseases of the ankle, eight spina-ventosa, and ten multiple localized tuberculosis. The total number treated by iodoform injections was seventy, of which fifty four (that is, seventy-seven per cent.) were discharged as improved or cured; the subsequent history of thirty-eight of these was obtained—thirty-four having been discharged as cured, and four as improved; of the thirty-four cured cases, twenty-six remained definitely well, two suffered from local recurrence, five died of tuberculous disease developing in other parts of the body, one died of an unknown affection; in three of the four cases discharged as improved there was local recurrence within a year.

These results, especially when compared with those commonly accepted as satisfactory before the inauguration of iodoform treatment, are certainly encouraging.

The functional results of cure were best shown in the cases of psoas abscess following spondylitis. Pain, contractures and limping vanished entirely, and the vertebral caries appeared to be checked. This latter effect was probably not entirely due to the iodoform treatment, since, together with this, the customary orthopedic appliances were used—that is, apparatus was applied by means of which extension and fixation were secured.

The functional results of the treatment of joint tuberculosis were not so satisfactory, though they compared well with those obtained by more radical procedures.

Wieland prefers an injection of ten-per-cent. iodoform emulsion in glycerin, both ingredients being thoroughly sterile. In the case of cold abscess the needle of the aspirator was driven in, the contents of the abscess evacuated, the sac thoroughly washed out with a four-per-cent. boric-acid solution, and from half an ounce to an ounce of the iodoform emulsion injected in. In case the abscess filled, this operation was repeated. Even if after a third or fourth puncture and injection the abscess filled, the treatment was continued. After this treatment the parts must be kept absolutely at rest, and over the abscess should be placed a pressure bandage, preferably of flannel. If the puncture is treated with antiseptic precautions, the formation of a fistula is not to be feared. The avoidance of this requires that the first dressing should not be left in place too long. Mixed infection makes the ultimate cure decidedly more difficult.

When after repeated punctures and injections the abscesses refused to heal, they were opened, curetted, treated with iodoform emulsion, and closed. In cases of joint tuberculosis without abscess, intra-articular injections of iodoform were made. Where there was caries of bone or joint, with fistula-formation, the conditions commonly present in hospital cases, necrotic tissues were removed by partial resections or curettings, after which the iodoform treatment was instituted, the injections being driven either directly into the granulating wound, into fistulæ, or into surrounding tissues. In the severe cases of tuberculosis of the ankle and wrist, with multiple fistulæ, the results from the iodoform treatment were often surprisingly satisfactory.

As to the toxic effects, there is often, following the injection, a sudden elevation of temperature lasting one or two days, with hurried heart-action and sometimes profound systemic depression, headache, and vomiting. Occasionally children show urticarial eruption. If the fever lasts more than two or three days, the patient becomes profoundly depressed and is often delirious. Exceptionally, marked symptoms of intoxication develop,—one such case is reported by Wieland, the pulse reaching 180, and delirium supervening, with suppression of urine. In four cases there was marked irritation of the kidneys, apparently not dependent upon the amount of iodoform employed; in two of these there seemed to be a development of acute primary nephritis, in the other two an exacerbation of the old disease.

Wieland states that as a result of his conservative treatment of surgical tuberculosis he is convinced that iodoform therapy, aided by orthopedic appliances and by minor operative procedures and careful attention to the general systemic condition of the patient, gives good results in children. This is particularly important, since the major operative procedures at this period of life are nearly always followed by great disability.

The disadvantage incident to iodoform lies in the length of time required for treatment, many of the cases lasting for years.

Wieland's paper is reinforced by careful case reports. Perhaps its special function and one of main importance is to call attention to the fact that the iodoform treatment of surgical tuberculosis requires more time and patience and as much skill and care as

are necessary in the performance and after-treatment of radical operations.

Incidentally he has shown also that the danger of iodoform intoxication, even when emulsions in place of solutions are employed, is a real one; hence the necessity for very moderate doses in the beginning of the treatment, and careful observations of the urine.

Careful reports such as this, giving full details of cases, ultimate results, and accidents occurring during the course of treatment, will enable the profession to gauge a given method of treatment at its full value.

Reports on Therapeutic Progress

THE LOCAL TREATMENT OF PRURITUS ANI.

In the *Philadelphia Polyclinic* of December 14, 1895, ADLER tells us that the pruritus induced by uterine catarrh can only be permanently removed by the cure of the prime factor in its causation. Relief from the itching can be afforded by cleanliness, frequent washing of the parts, and vaginal douches. Various sedative applications may be tried, such as one part of the official solution of plumbic subacetate to four parts of water, applied three or four times daily by means of cotton pledgets; or a lotion composed of one ounce each of chloroform, tincture of aconite, and tincture of opium, and six ounces of olive oil, the mixture to be shaken well before using, and smeared over the parts whenever the pruritus becomes annoying.

The destruction of worms, and the relief of any cutaneous inflammation about the anus which their presence has occasioned, will materially assist in the relief of the pruritus. Rectal medication—such as enemata of lime-water, weak solutions of quinine (20 grains to the pint of water) or of corrosive sublimate (1 to 4000)—only destroys the parasites in the rectum; for their complete eradication it is essential to reach the seat of their propagation in the small intestine. The best drugs for this purpose are moderate doses of santonin, aloes, or asafetida, alternated every other day with Hunyadi water, or, in the case of children, with solution of magnesium citrate. Reinfection is especially liable to occur in children, from the habit of biting the nails after scratching the anus. In this manner the parasites or their ova are carried into the mouth and become a nucleus for a fresh lot of thread-worms.

When pruritus is caused by animal or vegetable parasites, it is readily cured by the application of sulphur ointment, gently rubbed over the affected area at bed-time. The ointment should contain from half a drachm to a drachm of sulphur to the ounce of benzoated lard, and should be employed every night for a week or ten days. It is a mistake to use too strong a sulphur ointment and to continue its use for weeks, as an irritable condition of the skin is apt to follow.

A cleaner and equally efficient remedy, advised by the Messrs. Allingham, is a lotion of sulphurous acid of the strength of one part to six of water.

The removal of hemorrhoids, polypoid growths, fissure, and fistula, will enable the remedies applied for the relief of pruritus to accomplish their work in cases which would otherwise prove intractable. As a rule, when pruritus ani is established, the treatment of any organ or local condition which caused it will not cure the pruritus. On the other hand, Adler's experience differs from Dr. Mathews' observations in that pruritus has been frequently found to be symptomatic of some other rectal trouble.

The pruritus associated with a varicose condition of the rectal veins may be relieved by measures directed to toning up the parts and lessening any tendency to congestion. Bathing the anus night and morning, and after a movement of the bowels, will often accomplish this purpose. To prove efficacious, a sponge must be soaked in cold water and then squeezed dry by pressing it against the anus fifteen or eighteen times at each sitting. Another excellent treatment, to be applied by the physician, is the following:

> Fluid extract hamamelis, 1 fluidounce;
> Fluid extract ergot,
> Fluid extract hydrastis,
> Compound tincture benzoin, of each 2 fluidrachms;
> Carbolized olive oil (five per cent. carbolic acid), 1 fluidounce.

Mix. Shake well before using. One to two drachms as a rectal injection.

A small quantity of this should be given to the patient, with directions to smear it over the parts night and morning and after a passage of the bowels.

In pruritus ani, all discoverable local or constitutional causes having been excluded, we are brought in contact with a class of cases, by no means small in number, to which the term "neurotic" has been applied. That the condition is due to a neurosis, reflex or otherwise, Adler is not able, from personal observation, to confirm; but the theory is plausible, and is warmly advocated by Pro-

fessor Mathews. These cases tax the physician's resources to their limit in many instances. What relieves one patient will utterly fail in another, and what gives relief for a time may lose its effect entirely. Furthermore, it is impossible to state, with any degree of precision, as to the form in which to employ our remedies, for, as stated by the Messrs. Allingham, "in cases which appear best suited to ointments the ointment may utterly fail, and a powder, which you feared would be useless, may effect a cure." Therefore they advise their readers "to ring the changes between ointments, lotions, powders, and caustics."

Adler simply cites the following formulas which he has tried and found serviceable, without giving the indications for the use of any:

Mercury oleate, 2 drachms;
Morphine sulphate, 1 grain;
Lanolin, 3 drachms;
Ointment rose-water, ½ ounce.

Mix. Rub over affected area three or four times daily.

Calomel ointment,
Petrolatum (purified), equal parts.

Apply three times daily.

Zinc-oxide ointment, ½ ounce;
Balsam of Peru, 2 drachms;
Rose-water ointment, ½ ounce;
Lanolin, 2 drachms.

Mix. Apply night and morning after bathing parts freely with hot water.

Tar ointment, ½ ounce;
Belladonna ointment, 2 drachms;
Tincture aconite, ½ drachm;
Zinc-oxide ointment, ½ ounce;
Lanolin, 2 drachms;
Rose-water ointment, 4 drachms.

Mix. Apply three times daily.

Chloroform, 1 drachm;
Glycerin,
Tincture aconite, of each ½ drachm;
Lanolin, 2 drachms;
Rose-water ointment, ½ ounce.

Mix. Apply two or three times daily.

Renew prescription every week, as chloroform evaporates quickly.

Camphor, 1 drachm;
Alcohol, a sufficient quantity;
Lanolin, 2 drachms;
Purified petrolatum, 6 drachms.

Mix. Use night and morning.

Carbolic acid, 1 drachm;
Glycerin, 2 drachms;
Purified petrolatum, 5 drachms.

Mix. Apply two or three times daily, after cleansing parts.

Lotions:

Solution of lead subacetate, 1 drachm;
Milk, 1 ounce.

Mix. Prepare fresh daily, and smear over parts several times a day.

Sodium biborate, 1 drachm;
Morphine hydrochlorate, 5 grains;
Dilute hydrocyanic acid,
Glycerin, of each 2 drachms;
Water, 3 ounces.

Mix. Bathe parts three or four times daily.

Mercuric chloride, 4 grains;
Ammonium chloride, 10 grains;
Lime-water, 3 ounces.

Mix. Bathe liberally.

Silver nitrate, 20 to 60 grains;
Distilled water, 1 ounce.

Mix. Paint over parts every second or third day until the skin assumes a healthy condition.

A favorite prescription of Dr. Joseph M. Mathews is:

Menthol, 1 drachm;
Cocaine hydrochlorate, 20 grains;
Alcohol, 1 ounce;
Distilled water, 1 ounce.

Mix. Applied on a cloth frequently to relieve the itching.

Green soap,
Oil of cade,
Alcohol, equal parts.

Mix.

Amongst the various powders may be named: aristol, boric acid, zinc oxide, equal parts of calomel and bismuth, starch, etc.

Finally, the recommendation of the Messrs. Allingham may be employed, to wit: the introduction into the anus, at bedtime, of a bone plug, shaped like the nipple of an infant's feeding-bottle, with a circular shield to prevent its slippling into the bowel. The nipple should be about an inch and a half long and three-fourths of an inch thick. They advise the use of the plug on alternate nights only. By its employment a good night's rest is assured, and the itching is allayed.

THE TREATMENT OF LUPUS BY THE LOCAL APPLICATION OF CREOSOTE.

ZERENINE has obtained remarkable results in the treatment of lupus by the local application of creosote, being originally led to employ this method by the good results which he obtained in the treatment of pulmonary tuberculosis. The creosote is employed pure or mixed with glycerin in the proportion of one to three or one to ten. It is well to saturate a piece of gauze with a solution of creosote and oil, or creosote and glycerin, and to precede its application to the sore by scarification. In one case of lupus which had existed for fifteen years, and which had been treated by curetting without amelioration, the application of this creosote mixture caused a disappearance of the red color, the

movements of the jaw (which had become involved by cicatricial tissue) became more easy, the ulcerated surface improved in appearance, and almost complete cure was produced. In another case, in which a lupous ulcer of the nose had existed for nine months, the ulceration disappeared after a month of treatment, the parts being kept constantly wet with sterilized gauze wet with this solution.

In another case, in which lupus of the nose had returned after scraping, two months of this application of creosote in the proportion of one to three produced a complete cure. Zerenine believes this treatment is less apt to be followed by recidivity than curettage or plastic operation.

In the treatment of chronic suppuration dependent upon tubercular infection this author has also employed these creosote solutions with advantage, particularly in adenitis of the cervical and axillary glands, and in cases of tubercular suppurative osteitis in the foot the treatment proved very useful.—*La Médecine Moderne*, Nov. 30, 1895.

THE TREATMENT OF INCOERCIBLE VOMITING BY FARADIZATION OF THE PNEUMOGASTRIC NERVE.

This by no means new method of treatment of severe vomiting is considered by BONINEFIN in *La France Médicale* of September 20, 1895. He details cases in which severe vomiting was greatly relieved by this method of treatment continued for a period varying from ten to twenty-five minutes, the positive pole being placed over the pneumogastric nerve in the neck and the negative pole over the stomach. He believes that by this means we can not only control vomiting, but during the time faradization is continued food can be given which will be absorbed through the stomach, and thereby the patient will receive nourishment.

THE SUBCUTANEOUS INJECTION OF CAMPHORATED OIL.

SCHILLING, of Nuremburg, has reported the results obtained by him in the subcutaneous injection of camphorated oil in the treatment of infectious diseases, the patient being in a condition of collapse. The trouble with such stimulants as ether and musk, as he points out, is that they are too fleeting in their action, whereas the action of camphor is more prolonged. Schilling injects as much as fifteen to forty-five minims of a ten-per-cent. solution of camphorated oil, and he claims that relief is obtained after the injection of seven grains of camphor and that fifteen grains produces remarkable restorative effects. In one case of infectious endocarditis, with collapse, the author injected as much as thirty grains of camphor in one day, with good results, and in a case of pleuro-pneumonia with meningeal symptoms the injection of fifteen grains did not aggravate the cerebral symptoms—on the contrary, evidences of nervous excitement were markedly ameliorated. He does not think there is any danger of a cumulative action, as the camphor is eliminated by the urine two hours after its injection.—*La Médecine Moderne*, Nov. 30, 1895.

ANTINOSINE AS AN ANTISEPTIC.

Antinosine, a sodium compound containing iodine and phenol, is a blue powder, dissolving easily in water. It is supposed to possess antiseptic properties equal or superior to those of iodoform, and KRUSE tells us that on the *Micrococcus pyogenes* it acts as a powerful antiseptic. It also has a similar influence upon the bacilli of charbon and diphtheria, and arrests the development of nearly all pathogenic microbes. Clinically it has been found to be a useful dressing or pack for cavities. The absence of odor and of toxic properties, as well as lack of any irritant effects, makes it especially useful in affections of the nose, the ear, and the mouth. In cystitis and catarrh of the bladder it has been employed for the purpose of washing out this viscus and has given prompt amelioration, the urine becoming clear and pain disappearing.

LEWIN asserts that he has employed it as a dressing for syphilitic and non-syphilitic chancres, with success. The method of employment is to use a half-per-cent. watery solution as a gargle in the treatment of throat affections or of middle-ear trouble. Somewhat weaker solutions are employed for irrigating the bladder. On external surfaces it may be employed in powder form.—*La Médecine Moderne.*

EUDOXINE IN INTESTINAL CATARRH.

Eudoxine, a bismuth salt containing iodine and phenol, occurs as a brownish-red powder without odor, and is insoluble in water. It is, however, distinguished from the other salts of bismuth by its solubility in caustic

soda solutions, when it gives a blue-violet color.

Clinically it has been found to be of advantage in intestinal catarrh, particularly in those cases in which tuberculosis is present. The dose is fifteen grains three times a day, and it does not produce any secondary effects. In chronic inflammations of the intestine it seems to exercise a thorough curative influence, and it is good in cases of colic with tympanites and dyspepsia and diarrhea, if aided by the patient using a proper diet. The dose for a child of two months is one-half grain three times a day; for a child of four months, one grain; for a child of one year, 1½ grains; for adults as much as one or two grammes may be given.—*Journal de Médecine de Paris*, Nov. 24, 1895.

THE TREATMENT OF DIPHTHERIA.

The antitoxin treatment of diphtheria has so engrossed the attention of the profession that we fear there has been a tendency to rely entirely upon its therapeutic advantages and to ignore the fact that one of the most important directions which the physician can leave in regard to his patient is that which deals with the maintenance of nutrition by means of a proper diet, and the employment of stimulants in order to aid the antitoxin and the vital resistance of the patient in its struggle with the disease. In a very useful article upon the treatment of diphtheria, published in the *Revue de Thérapeutique Médico-Chirurgicale*, October 18, 1895, Lyon emphasizes the fact that substantial alimentation should be afforded the patient in the way of milk, light soups and broths made from various kinds of meat, and in the way of stimulants coffee and alcoholic drinks, such as wine and champagne, should be given. He believes the milk is particularly indicated, as facilitating the elimination of toxins from the body. The absolute anorexia which is present in the greater number of patients suffering from diphtheria offers a serious obstacle to forced feeding, and this is increased if intubation or tracheotomy has become necessary; but nevertheless every possible opportunity of getting food, predigested or otherwise, into the patient, should be taken advantage of. Lyon believes that intestinal antisepsis is important, and he therefore administers cachets or capsules containing minute doses of creosote, which he believes also have a favorable influence upon the pulmonary mucous membrane. Iron (in the form of the perchloride) and quinine are also useful. If the patient is a young child, he is apt to prescribe the following:

℞ Quinine hydrochlorate, 1 drachm;
Syrup, 1 ounce;
Cognac, ½ ounce;
Infusion of coffee, 3 ounces.

Of this a teaspoonful may be given several times a day.

Should myocarditis develop in the course of the disease, Lyon depends largely upon subcutaneous injections of caffeine; should broncho-pneumonia develop, he utilizes inhalations of oxygen and insists upon the administration of alcoholic stimulants; while if collapse is threatened, a hot bath is also of value; but he believes that the application of counter-irritation over the throat is useless. The attack of diphtheria having once passed by, he employs the interrupted electrical current for the relief of paralysis, and active friction to bring blood to the paralyzed part, with salt baths and massage.

ANTIPYRIN IN THE TREATMENT OF CHILDREN.

In *La France Médicale*, September 6, 1895, Comby gives the results of his employment of antipyrin in infantile diseases. He finds that small doses, varying from two to three grains, are valuable in the treatment of chorea, and that if the child is as old as six, eight, or ten years, even fifteen or thirty grains or more may be given without danger. Usually however, he finds that five to fifteen grains a day is sufficient to produce marked sedative effects. So confident is he of the harmlessness of antipyrin in diseases of children that he would not be afraid to administer very much larger quantities than this, and if he finds the child possesses no particular susceptibility he frequently begins with as large a dose as fifteen grains a day and increases this up to as much as sixty grains a day. He believes that only by the employment of these large doses can we get good results in severe chorea. In whooping-cough he often finds it necessary to give similarly large doses. In neuralgia he thinks it of great value, particularly about the period of puberty, and in the fevers of childhood he also regards it as a valuable remedy. His method of administration is as follows:

℞ Caffeine, 75 grains;
Antipyrin, 2½ drachms;
Simple syrup, 12 ounces.

☞ A teaspoonful two or three times a day according to the age of the child.

Or he uses:

℞ Caffeine, 15 grains;
Antipyrin, 15 grains;
Distilled water, 150 minims.

Employing this solution for hypodermic injection in divided doses. [This is a very painful injection.—ED.]

Comby is particularly enthusiastic in regard to the employment of antipyrin in the fevers of childhood. He regards it as absolutely safe and yet effective. In the treatment of the diarrhea of early infancy he also believes it is of value, owing to its antiseptic influence in the intestine.

He concludes his paper by stating that antipyrin is a useful medicament, well borne by children at all ages; that it has very slight toxic properties and can be given in safety in large doses; that when given in these doses it may in certain cases produce a fugaceous erythema, but does not produce disturbances of the stomach nor cause irritation of the kidneys. He gives, according to age, anywhere from three to fifteen grains of the drug at a time, and repeats this dose from two to six times a day, and has continued to do so for weeks without disadvantage. He even goes so far as to state that in chorea antipyrin is an infallible remedy.

[Personally, the editor of this journal regards these doses as distinctly dangerous, and records them chiefly to show what large doses have been given without producing dangerous symptoms in Comby's hands.]

THE TREATMENT OF ACUTE ARTICULAR RHEUMATISM.

In *L'Union Médicale* of November 2, 1895, is an article on this subject of considerable interest. The author considers that salicylate of sodium is practically a specific, and recalls the fact that Dujardin-Beaumetz was in the habit of administering every two hours very large doses of the drug, preferring massive doses to its fractional administration, and believing that it was best given in syrup diluted with a copious drink taken at the same time. The most favorable time for the administration of these large doses of the salicylates is at night, as by this means the inconvenient concomitant effects (such as ringing in the ears, and the sweats) are largely escaped by the patient going to sleep. The dose is to be repeated every twenty-four hours, being given twice with an hour interval. Usually the desired effects are obtained after as much as 60 to 120 grains are given. The author does not consider that the presence of endocarditis or pericarditis contra-indicates the employment of these large doses; the only contra-indications are the untoward effects which are commonly seen in connection with the ears and skin. A general contra-indication, however, in acute articular rheumatism, is inactivity of the kidneys, particularly in pregnancy and in those cases in which the rheumatism is accompanied by albuminuria.

Mention is made of the fact that Weiss has highly recommended the method of Bourget of using salicylic acid in an ointment about the inflamed joints. This ointment generally consists of salicylic acid, lanolin, and turpentine, of each 2½ drachms, and lard 3 ounces. This is placed about the joint and rubbed in as vigorously as the pain will allow, and the part is then bandaged with flannel. If for any reason salicylate of sodium or salicylic acid cannot be employed, it is recommended that pills composed as follows shall be administered:

℞ Salophen, 2 grains;
Extract of gentian, ½ grain;
Liquorice powder, sufficient to make one pill.

Five of these pills are to be given in the morning and five at night.

Attention is again called to the fact that the greatest care must be used in the administration of salicylic acid to pregnant women and in albuminuria, and it is thought best under these circumstances to substitute antipyrin for it, particularly if the pain is severe. Mention is made of exalgine, but it does not receive very favorable consideration. Hot baths are sometimes of value if the patient is strong enough to stand them; they nearly always bring relief of pain and cause sleep, but on the other hand they may produce exhausting sweats.

EARLY TREATMENT OF PENETRATING WOUNDS OF THE EYE.

BRYANT, in Wilkinson's *Omaha Clinic* for November, 1895, tells us that there are some general rules that can be laid down in the treatment of these cases that will be proper for all, while special rules will be called for in others, depending upon the location and depth of the injury.

Rules which will apply to the majority of cases are the following:

Careful cleansing of the injured parts and of the palpebral sac with some aseptic or antiseptic solution, as the case may seem to require. Boiled water, with or without the

addition of boric acid or the bichloride of mercury, will fulfill these requirements.

Loose ends or fragments of cornea should be removed and the lips of the wound brought into as nice apposition as possible.

If the iris protrudes through the wound and is uninjured, after being thoroughly cleansed it should be carefully replaced in the anterior chamber with probe or spatula, if this be found possible, and if not the protruding portions should be removed.

If the prolapsed iris is lacerated, it should be snipped off with scissors at once. If the wound is in the central portion of the cornea, atropia sulphate in solution of two or four grains to the ounce (according to the age of patient) should be used with sufficient frequency to produce wide dilatation of the pupil within a few hours' time, so as to remove the iris from the location of the wound and thus prevent a recurrence of the prolapse. The atropia not only does this, but is the best remedy known to prevent and control an inflammation of the iris itself which may follow the accident whether the iris is injured or not.

If the wound is near the periphery of the cornea, a solution of eserine or pilocarpine should be used to contract the pupil, rendering the iris so tense that it does not bulge and protrude through the wound.

After the first twenty-eight hours, or as soon as the edges of the wound adhere, it will be well to change the myotic to a mydriatic to prevent, in so far as possible, an iritis.

Should the lens or deeper structures be injured, the same treatment should be followed, to put the case in the most favorable condition for the further treatment which it will require.

After the cleansing of the wound and palpebral sac and replacing or removal of prolapsed iris, a pressure bandage should be applied. This will answer the double purpose of giving support and rest to the injured parts. A bandage of gauze over a light pad of cotton fulfills the indications here and does not make the hot dressing that some of the heavier bandages do.

Cold applications are indicated in all of these cases except the milder ones, and are best applied over the light dressing just described.

In private and hospital practice Bryant gets the best results, with the least discomfort to the patient, by using broken ice in a small ice-bag which can be kept applied over the bandage the greater part of the time. In this way the cold without the moisture is secured, which is much better for the injury itself and not so disagreeable or uncomfortable to the patient.

Pain should be relieved, and rest and sleep procured, by the use of morphia, if necessary, as these conditions are as essential here for the prevention of inflammation and the hastening of the reparative process as in wounds of other parts of the body.

Briefly, then, the early treatment of perforating wounds of the eye can be summed up as follows: in the careful cleansing of the parts, the replacing or removing of the prolapsed iris, the use of the bandages and application of cold, the use of morphia to relieve pain and procure rest, and the free use of atropia to produce complete dilatation of the pupil.

The last remedy he finds more frequently neglected than all others, or, if not actually neglected, used in so weak a solution or with so little frequency as to produce no apparent effect. This is probably due to the teaching in some of our text-books, the authors of which dilate upon the danger of its use, such as glaucoma and systemic poisoning, until men in general practice are afraid to use the drug in sufficient strength and with sufficient frequency to get any good effect from it. The dangers in the use of atropia are so slight as to only be remembered as possibilities in the treatment of these injuries. The safest rule to follow in the use of this drug is for the physician himself to instill a few drops of the solution in the eye, and repeat every fifteen or twenty minutes, until the desired effect has been obtained, when it will be found that a few drops three or four hours apart will maintain the effect.

SPORADIC GOITRE.

In a paper of considerable length in the *Lancet* of November 9, 1895, GORDON HOLMES tells us that in a London throat clinic goitre is met with in three sharply defined manifestations.

1. Tumors variable in size, but never very large, variable also in consistency, and apparently of purely local significance. The swelling is not usually remarkable for its symmetrical outline: it may extend across the whole front of the neck, or exist only on one side or in the middle. When the whole thyroid gland is involved, one lobe may be implicated much less than the other; the isthmus may be the chief seat of enlarge-

ment or may appear as a well defined depression between two lateral eminences. As a rule, the goitre is firm but compressible and more or less movable on the neck. In a minority of cases, however, it is remarkably dense. Some hard goitres have a very regular surface, whilst others are more or less irregular and may even give the impression of a rather rough stone wrapped in a covering of integument.

2. The second class of goitres is comparatively rare; it resembles the first class in seeming to be a purely local manifestation, but the tumor differs considerably as to shape and density. Regularity of outline, smoothness of surface, and concentricity are the rule. Occasionally, however, two or more swellings, conjoined to a greater or lesser extent, are met with. To palpation these goitres give a tolerably clear impression of containing fluid, and are, in fact, cysts.

3. In this division are to be reckoned a number of thyroid tumors, as a rule soft and puffy, and also diffuse and symmetrical, which generally commence in young people between the ages of fifteen and twenty years. They differ from the two first classes in being allied, in a great majority of instances, to one or more of certain other symptoms—viz., nervous exaltation, neurasthenia, cardiac excitement, anemia, and less frequently protrusion of the eyeballs (exophthalmos). Some of these, however, are probably merely examples belonging to the two former varieties in an initial stage. In the most pronounced cases the action of the heart is very tumultuous and the pulse may attain 140 or 150 beats per minute. Under these circumstances throbbing of the carotids may be so great as to produce a visible rhythmic movement of the goitre and to communicate a considerable systolic jerk to the hand if placed on the tumor. A murmur may be heard with a stethoscope. Whether there is a pulsating expansile movement in the substance of the swelling, is a doubtful point. Looking to the great vascularity of the thyroid body, which receives more blood than the brain, it might well be so, especially if the vessels were dilated or multiplied in proportion to the mass of the goitre. Another peculiarity of this kind of bronchocele is that a variation in size, perhaps at different periods of the same day, is liable to occur. It may happen that the tumor as a regular occurrence is larger in the evening, or the increase may be only occasional, concomitantly with indisposition, mental excitement, or the catamenial flow. As to the exophthalmos, it may be so slight as almost to escape notice, or it may proceed to such an extent that the strain on the envelopes of the eye produces ulceration of the cornea; this, however, is rare, and the writer has not met with such a case. The patients when seen by the practitioner are generally in a very nervous condition, sometimes scarcely able to speak intelligibly, from muscular tremor and paresis. Tremor and drooping of the eyelids are often noticeable. Anemia is not constantly present, and occasionally the patient seems to be rather plethoric than otherwise. The evolution of symptoms in Graves' disease seems to take the following order: neurosis, cardiac excitement, goitre, and exophthalmos. But the thyroid gland may, of course, be in a morbid condition before its hypertrophy becomes apparent.

In ordinary cases of goitre, such as given above in the first class, excision of the tumor has been a favorite operation with German surgeons, notably Lucke, Billroth, and Kocher. During the recent Surgical Congress at Berlin the last-named presented his list of such operations completed to the number of 1000. Generally speaking, however, this means of radical cure has rather declined of late years, owing to the discovery of myxedema. This affection was independently noticed by Kocher in the form of "cachexia strumipriva," the term he applied to a train of symptoms observed by him to follow frequently on the total removal of a goitre. Tetany also very commonly occurs after complete excision. The difficulty is now met by leaving a small portion of the gland to fulfill the functions of the organ. Out of the 1000 cases of excision Kocher has put on record, only twelve per cent. of deaths resulted from the operation.

A brief allusion will here suffice to the method of treatment employed extensively in India by a Captain Cunningham, and said to have been successful in some scores of thousands of cases. We allude to applying an ointment of biniodide of mercury to the surface of the goitre, and then causing the patient to keep the part exposed to the glare of the sun for an hour or several hours until blistering occurs; then the ointment may be reapplied and the case left alone for twelve months, when, if the cure is not complete, the measure can be repeated. This treatment doubtless falls in easily with the habits of natives of the tropics, but it has failed here, owing probably to its being less consonant with the routine or perhaps the solar opportunities of European life.

We now come to the means of treating goitre introduced about a quarter of a century ago by Alfred Luton, of Rheims—viz., the injection of iodine into the substance of the tumor. This is undoubtedly the greatest advance ever made for the relief of bronchocele. Compared with excision the procedure is without risk, either with respect to life or myxedema, whilst in suitable cases the result is almost as certain as in the grave operation. It must be borne in mind, however, that very hard goitres will not yield to this treatment—the success of the injections is, in fact, precisely in an inverse ratio to the amount of induration. Thus, in some instances only a slight diminution of the swelling can be attained, but in a majority absorption will proceed until practically nothing is left of the tumor. The writer has found that in ordinary cases (when the goitre is, let us say, somewhat less in size than the average fist) an injection of about twenty minims of tincture of iodine once a week produces the maximum of reducive effect. Frequent injections are not, however, necessary to recovery, as the contractile result of a single operation does not die out altogether until a month or more has elapsed. Occasional injections may, therefore, be quite as successful as regular hebdomadal ones; but of course the time occupied will be proportionately longer. The slower treatment is advisable in the case of nervous and delicate patients, as the first effect of an injection is to produce some parenchymatous swelling and inflammation, which for two or three days is often accompanied by rather severe pain about the neck. Hence weakly persons soon begin to dread the little operation. In such cases it is well on each occasion to freeze the surface with ether spray at the point chosen for inserting the needle. How the injection acts is not quite certain; but it seems that the point of lodgment forms a focus from which the substance of the gland becomes devitalized in a diminishing degree throughout a considerable area. Consequently, an active absorption of débris is set up, stimulated by the inflammation, the iodine, or both. The specific part played by the iodine is, however, a minor one, as good results can be obtained by the similar use of other fluids, such as solution of perchloride of iron, alcohol, dilute acetic acid, etc. As to the mode of procedure, the point of the needle should first be steadied on the spot selected for entry; then, by a quick movement, the needle is driven straight in for half an inch, or more, according to the size of the goitre. Practicing the insertion rapidly in this way, the stab is so little felt that an ordinary patient will scarcely wince. When carelessly done the needle may carry the skin over the smooth surface of the goitre and enter at an acute angle, being itself bent or broken in the process. It is advisable that the needles for these injections should be stouter than those furnished for ordinary hypodermic use in which it is only necessary to penetrate to the subcutaneous tissue. Unless the tumor is distinctly bi-lobed or extends across the whole front of the neck, it makes not much difference whether the injections are made always at the same spot or in various places. In the smaller goitres the needles must be directed from the point of entry towards the centre, and thus the site of lodgment will be always practically the same. The effect of the injections is, however, somewhat widespread, and even when the whole mass of the thyroid gland is involved the swelling may be observed to diminish on one side while the treatment is confined to the other side.

As to very large goitres—the size of the head or thereabouts—he has only seen one such, and in that the injections were unsuccessful, although the tumor was rather soft and appeared to consist of a number of fibro-cysts, each being somewhat larger than a walnut. Such developments are undoubtedly very rare in sporadic instances.

The treatment of bronchocele by the internal administration of drugs has been very extensively attempted, but the results are only occasionally satisfactory. Iodide of potassium has, of course, been generally the sheet-anchor, but hydriodic acid and hydrofluoric acid have, for a time at least, been strongly advocated. At the German congress above mentioned Kocher spoke very highly of thyroid gland and phosphate of potassium used conjointly, and such a recommendation coming from a surgeon so habituated to the use of the knife in these cases should certainly carry great weight.

2. In cystic goitres the indications for treatment are simple and after the old-established measures adopted for the radical cure of hydrocele—tap the cyst and inject some fluid capable of setting up an inflammatory process by which the secreting membrane lining the cavity may be destroyed. Thus the tumor is entered about its lower third by a medium-sized trocar and cannula, care being taken to avoid any vein which may appear near the surface. When the contents are evacuated,

two or three drachms of solution of perchloride of iron (two drachms to the ounce) are injected through the cannula, which is stopped with a plug and allowed to remain in, its retention being ensured by some suitable fixing. The discharge-pipe of the syringe used should be bent at an obtuse angle, so that the body of the syringe is held somewhat upright when injecting. This form was adopted by Mackenzie after he had had a death from injecting air into a vein, in order to ensure that no bubble of air should remain in the liquid injected. After two or three days the plug is removed, when, in the most favorable cases, the discharge will be found scanty, mixed with some pus, and perhaps a little blood. The plug is reinserted and removed daily or on alternate days for two or three weeks until the discharge diminishes to a small amount of purulent liquid. Finally the cannula is withdrawn, and the opening is afterwards kept open by any simple device, such as keeping a piece of thin wax bougie strapped into it with plaster, until the discharge ceases and the cyst is evidently obliterated. Sometimes it happens that the goitre very rapidly refills and there is little evidence of the interior irritation which should result from the injection. The latter must then be repeated. In the most obstinate cases Woakes's plan of passing a probe or "acid-carrier" dipped in saturated solution of chromic acid into the cyst, may be tried.

It must be impressed on the mind of any practitioner without experience of this treatment that the operation, simple as it is, causes a great deal of constitutional disturbance. In women not particularly robust the pulse will often rise to 120 or more immediately after the tapping, and several weeks will often elapse before the vascular fervescence at length gradually subsides. Deaths have been reported, though none have come under the writer's own cognizance. Females, however, who are in any way fundamentally delicate, often remain in a state of weak health for many months.

He has never heard of any drugs being vaunted for the cure of cystic goitre, but electrolysis has been tried, as it has in other goitres, with, however, more promising results. According to Dickson, of Toronto, the best method is to empty the cyst by means of an aspirating needle insulated to within an inch of its point; then refill the cavity with a solution of common salt and connect the needle with the negative pole of the battery, the positive electrode being applied between the shoulders. A current of 30 milliampères may be employed for fifteen or twenty minutes, after which the sac is to be emptied and the opening sealed. The repetition of this procedure two or three times at short intervals may effect a cure.

It may be mentioned that operating surgeons sometimes enucleate the cyst in this class of goitres.

3. Until recent years exophthalmic goitre has been regarded as entirely outside the domain of surgery. The patient has, therefore, been subjected to the influence only of such drugs as seemed likely to combat the symptoms, especially bromides, digitalis, strophanthus, etc., with perhaps a surface application of electricity to the tumor or to the cervical sympathetic after the manner of Eulenburg. Iodine has not been relied on in this affection, as it has in ordinary goitres, although in one case recounted by Trousseau it appeared to have a specific action. Both thyroid and thymus glands, antagonistic substances as it is thought, have recently been administered, but the evidence does not yet enable us to decide as to their value. The persevering use of galvanism to the goitre sometimes produces a diminution of size, but the value of electricity is most marked when the negative electrode is applied to the course of the sympathetic nerve in the neck. An almost immediate reduction of the pulse to 80 or 90 often follows, with a general sense of relief to the patient, which may last for two or three days. When there is a tendency to spontaneous cure, or the malady is stationary, such measures are palliative in a very high degree. As early as 1873, Watson of Edinburgh had excised the goitre in three cases with encouraging results, but he was practically without imitators. Now, however, owing to the different views spreading as to the nature of Graves' disease, radical measures are steadily coming into vogue. Thus at the recent German Surgical Congress, Mikulicz of Breslau brought forward a number of cases treated by partial excision and also some by ligature of the afferent arteries. Unfortunately, at present the wave of psychotherapeutics has risen to such a height that a considerable number of practitioners are ready to attribute every successful result to hypnotic suggestion.

The author himself has been accustomed for some years to inject these cases as in ordinary goitres, though at much longer intervals than when there are no signs of neurosis. Not that he considers there is any

special danger to be apprehended from the injection in such patients, but merely that the subjects being as a rule in a very nervous state, the mere prick of the needle may drive them into hysterics, make a scene, etc., at the time, and even after some days the practitioner may hear that the patient is still displaying unusual restlessness in the domestic circle. After the injection has been done two or three times, however, this condition of things to a great extent passes off, and the sufferer submits with tolerable equanimity to the operation. It is just in this class of cases that freezing the surface becomes a valuable preparatory measure, and it is highly advisable to have recourse to it. He has little doubt that in the future the cardinal rule for treatment of exophthalmic goitre will be to first get rid of the bronchocele. Electrolysis has been tried in exophthalmic goitre, but he has met with no laudatory reports of its action.

THE PRESENT STATUS OF SERO-THERAPY.

The *Boston Medical and Surgical Journal* of November 28, 1895, in an editorial article states that:

At the Sixth Congress of the Italian Society of Internal Medicine, held at Rome, October 22 to 25, the present status of sero-therapy was discussed by Pio-Foa of Turin, Maragliano of Genoa, Petrone and Fazzo of Naples, Campana of Rome, and other eminent bacteriologists and clinicians.

MARAGLIANO claims to have experimentally obtained an antitoxic serum which possesses curative efficacy in tuberculosis, and which is giving good results in his own practice and in that of several of his confrères; the mode of preparation of this serum will eventually be published, though he is unwilling to make it known at present; it is derived, he says, "from animals vaccinated with all of the toxins contained in the virulent cultures, both those that resist and those that do not resist heat. Campana, of Rome, affirms his belief that Maragliano's serum is nothing but Koch's tuberculin, improved. As a dermatologist, he declares that this lymph in tuberculous affections of the skin favors the resorption of morbid infiltrations, but does not cure the tuberculous processes, and the same affirmation applies to tuberculosis of internal organs.

Fasano, of Naples, reported a case of pulmonary phthisis which seemed to have markedly improved under the use of this serum. Marrani, of Rome, has treated with benefit twelve cases of tuberculous bronchopneumonia with Maragliano's serum. The results were, disappearance of the fever, of the râles, of the cough, of the dullness, a gain in spirits and in appetite, and increase of weight. Ascenzi of Rome, and Argento of Palermo, communicated—the first three, the second five—cases of tuberculosis treated with success by Maragliano's serum.

With regard to the serum treatment of diphtheria, Mya of Florence stated that he had treated 112 cases of diphtheria at the clinic of children's diseases with Behring's antitoxin; the results were twenty-two deaths and ninety recoveries. In a first series of fifty-one cases he had to do with diphtheria of the pharynx and larynx; there were fifteen deaths, giving a proportion of 29.4 per cent, (under the old treatment he used to have in these cases a mortality of fifty per cent.). A second series comprehends forty-three cases of simple diphtheria of the pharynx, with seven deaths and thirty-six recoveries. In a third and last series there were eighteen cases of pharyngeal diphtheria with beginning of extension to the larynx; all these recovered rapidly. In all these cases the diagnosis was controlled by the bacteriological examination.

Mya is in the habit of injecting daily during the first three days of the sickness 10 Cc. of serum. In fatal cases he has often observed want of success to coincide with a notable degree of hypertrophy of the glands; the autopsy has disclosed, along with grave alterations of the lymphatic system, fatty degeneration of the viscera. He is persuaded that if one would have recourse with success to sero-therapy in diphtheritic cases, there must be relative integrity of the lymphatic system. Another group of cases in which sero-therapy proves inefficacious includes those forms of diphtheria in which the exudate invades very rapidly the whole respiratory tract—that is, not only the larynx and trachea, but also the bronchial tubes. It is principally in the coldest months of the year that he has observed cases of this kind.

Maragliano, in summing up the diseases in which sero-therapy has been employed with more or less success, remarks that in streptococcus infection (notably in erysipelas and puerperal septicemia) the serum treatment has already produced sufficiently encouraging results to warrant further trials.

No success has followed attempts to similarly treat typhoid fever and cholera—that is,

by the use of a serum obtained from patients recovered from the disease, or from immunized animals.

In tetanus, among thirty cases treated with serum from animals immunized by attenuated toxins, there have been thirteen recoveries.

Maragliano sums up the statistics of serotherapy in diphtheria by citing Huebner's figures: In 3066 cases there was a mortality of 20.6 per cent.; this is contrasted with a mortality of 38.8 per cent. before the use of antitoxin. He thinks that "the enthusiasm aroused by the discovery of Behring has been justified by the splendid results obtained in practice."

With regard to the serum treatment of pneumonia, there is little to add to the results obtained some time ago by the two Klemperers, and by Fowlisky and Emmerich; the Klemperers, in particular, claiming remarkable clinical success in several cases with their "anti-pneumococcic serum." Pio-Foa, who was referee at the meeting of the congress aforesaid, has been making numerous experiments on animals with a serum of his own preparation, which he calls an "anti-pneumococcic vaccine." He first tried glycerin extracts of infected blood, the glycerized extracts of the bodies of bacteria remaining on the filter, the precipitates obtained with sulphate of ammonia, etc. After having found out the complete inefficacy of the chemical vaccinations, with the exception of the filtrate of the meningococcus, he tried to obtain a vaccine prepared according to Pasteur's methods (attenuated by heat, by oxygen, by light, etc.). He finally obtained the desired attenuation by means of Lugol's solution, and by means of intravenous injection he now succeeds in vaccinating hares against the different varieties of *Diplococcus lanceolatus*, so as to cause them to support with impunity 160 Cc. of a culture sufficiently virulent to kill the test animals in a few hours. The duration of the immunity seems to be quite long—that is, three months, at least.

The experiments which Pio-Foa related, where hares, dogs, sheep and goats were rendered refractory to the pneumococcus infection, were of great interest and warrant hope that the serum treatment may yet be found to be of unequivocal benefit in the pneumococcus diseases of man. Foa found that when both the diplococcus and the serum were injected at the same time the animal survived, and when the serum was injected five hours after the infection the symptoms were light and the animal soon recovered; which indicates that the serum also exercises a curative action.

GLYCERIN IN INDUCTION OF LABOR.

HYPES contributes a paper bearing this title to the *American Journal of Obstetrics* for December, 1895. To sum up the argument: Intra-uterine injections are often inefficient, especially so in doses under 50 Cc. They are liable to be followed by all the ill-effects—shock, air embolism, thrombosis, metritis, and sepsis—of other intra-uterine douches which have been used and abandoned during the present century. They may and sometimes do produce glycerin poisoning—*i. e.*, decomposition of the blood-corpuscles—resulting in diseases of various organs, but more especially in nephritis with hemoglobinuria. The method takes no consideration of the life of the child, and hence results in great fetal mortality. Its use should be abandoned or the dosage reduced, especially in subjects with prior existing kidney affections.

UTERINE HEMORRHAGE.

In the *Clinical Journal* for Dec. 18, 1895, ROUTH enumerates the drugs useful for hemorrhages, as follows:

Ergot.—This is the remedy oftenest given. It acts by contracting the arterioles, apparently by virtue of its action upon the involuntary muscular fibre; and it has a special action upon the uterine muscle, encouraging tonic contraction. It may sometimes act on the intestines, and some people cannot stand it for that reason; this is well seen when the sucking child gets colic while the mother is taking ergot. Occasionally also one sees the effect of ergot on the heart, by a resulting pseudo-angina and infrequency of pulsation, especially in people whose hearts are already incompetent. The arterioles all over the body become contracted, and the heart is thus given more work to do. As a rule, however, ergot can be given for any length of time without trouble. By the lessened vascularity which it produces in the uterus it impairs the nutrition of fibroids, and it favors their extrusion by the uterine contractions it excites. Ergot ought to be given continuously in all cases of uterine hemorrhage where it is likely to be of service, beginning, as a rule, on the third or fourth day of the period, and suspending just before the menses again come on, especially if dysmenorrhea be usually present. Sometimes

one can continue the ergot in such cases by adding belladonna. The usual doses are one-half drachm of fluid extract ergot three times a day, or one or two grains of ergotin, or $\frac{1}{120}$ to $\frac{1}{30}$ grain of the very much stronger ergotinin.

Hydrastis is another very valuable drug, and is somewhat similar in its action to the combined effect of ergot and belladonna; for besides producing uterine contraction, and checking hemorrhage in the same way as ergot, it is a sedative. Half-drachm doses of the tincture answer very well.

Cannabis indica is also one of the best drugs we have, but it is not often given. One-fourth, one-third, or even one-half grain of the extract of cannabis indica is the usual dose, and it often seems to stop hemorrhage even better than ergot or hydrastis. If there be pain as well as hemorrhage—as, for instance, in dysmenorrhea caused by fibroids of the uterus—cannabis indica is much more useful than ergot. It can also be given in the form of tannate of cannabin, two to ten grains. The tincture is unreliable.

Lately Dr. Wright, of Netley, has introduced *chloride of calcium*. It was used many years ago in conjunction with bromide of potassium and chloride of ammonium for fibroids. At that time the action of the chloride of calcium was not understood; it was supposed that it deposited lime salts in the tissues of the fibroid, inducing calcareous degeneration. It does not do that. Dr. Wright has found that it is useful in many cases of hemorrhage, especially those due to hemorrhagic diathesis. He was able to check hemorrhage by giving two- to three-drachm doses of the B. P. preparation (liquor calcii chloridi) three times a day, after meals, for two or three days. [The strength of this preparation is one drachm of the calcium chloride to five of water.—ED.] Dr. Wright finds its action is due to the fact that the blood coagulates much more readily under its influence. The writer has tried it in one or two cases in which ergot and cannabis indica have failed, and it certainly does check the passive oozing of blood which sometimes continues for a week or ten days after the more profuse flooding which occurs in many cases of fibroids, and may prove to be a useful adjunct to the means already at our disposal to tide some of these bad cases over the menopause, and so enable us to more often dispense with oöphorectomy or hysterectomy.

While speaking of these special drugs, purgatives must not be omitted. They are of the greatest possible importance in the treatment of all uterine hemorrhages, and should invariably form part of the measures adopted.

THE DANGERS OF POTASSIUM IODIDE IN THE TREATMENT OF GOITRE.

At a recent meeting of the Société de Thérapeutique, a report of which appears in *Le Progrès Médical* of November 23, 1895, M. FERRAND related the following case, which had come under M. Couchon's observation: A man, thirty-five years old, suffering with an enormous goitre, had been taken with congestive symptoms. A physician had prescribed an iodized ointment and sixty grains of potassium iodide daily. The patient continued the treatment for three weeks, at the end of which time the goitre had diminished in size, but coryza, dyspnea, diarrhea, trembling and cachexia had supervened, and the patient died at the end of a month with symptoms of cardio-pulmonary paralysis. M. Couchon thought these symptoms might have been due to atrophy of the thyroid body.

M. Ferrand remarked that Lebert thought goitres were particularly susceptible to treatment with potassium iodide; Reuser had also observed the same thing. M. Jasiewicz said that occasionally very small doses had caused symptoms of iodism. M. Paul said that iodide poisoning was more frequently caused by personal susceptibility than by the size of the dose. M. Ferrand thought that the difficulty of elimination should be taken into consideration. In the case in question, he said, the poisoning had given rise to troubles of nutrition much more profound than could be attributed to the cachexia strumipriva. M. Paul remarked that in cases of poisoning from potassium iodide, iodism should not be exclusively considered. The different iodides did not act wholly through the iodine, as the different action of each of the following drugs demonstrated: potassium iodide, sodium iodide, iron iodide, and the tincture of iodine.—*New York Medical Journal*, Dec. 14, 1895.

THE ACTION OF MUSTARD AND PEPPER ON DIGESTION.

In nearly all experiments dealing with the action of condiments or other like substances on digestion, the work done has been limited mainly to the influence of the substance upon the secretion of gastric juice, or to the effect of the presence of the substance upon the pure-

ly chemical process of gastric digestion. Dr. GOTTLIEB, of Heidelberg, however, has recently tried some interesting experiments on the influence of mustard and pepper on the secretion of pancreatic juice. The experiments were conducted on rabbits, a cannula being inserted in the pancreatic duct, after which the condiments were introduced into the stomach. The presence of either of these substances in the stomach led to a marked increase in the secretion of pancreatic juice, the volume of fluid being increased three to four times. As might be expected, the juice secreted under these conditions was somewhat more watery than normally, but it showed the usual digestive properties on all three classes of food-stuffs.—Editorial in *Dietetic and Hygienic Gazette*, November, 1895.

SUSPENSION OF THE UTERUS.

KELLY (*Journal of the American Medical Association*, Dec. 21, 1895) states that the mortality in the two hundred cases he has operated upon since his residence in Baltimore, has been zero, and there was not a case of serious illness following the operation. There has been one recurrence of the retroposition, making the failures one-half of one per cent. In about five per cent. of the cases stitch-hole abscesses and separation of the lower angle of the incision occurred; this accident very rarely happens now, with his present technique in closing the abdominal incision.

The suspensory operation was abandoned in one case recently because the enlarged uterus was so friable that the stitches cut out as soon as they were tied.

In all cases where the vaginal outlet was relaxed it was repaired; at the same time the uterus was suspended. When there is both retroflexion and a relaxation of the vaginal outlet, if he can do only one operation he prefers to lift up the outlet under the pubic arch. It is well known that Kelly is an earnest advocate of the direct method of treating retroflexion by a small abdominal incision, bringing the uterus into anteposition and holding it there by two stitches through the anterior abdominal wall and the posterior surface of the fundus. He does this for four reasons, which are:

1. A natural tendency to continue investigation in the line already opened up.

2. The advantages of a direct inspection of the ovaries and tubes, as shown by the cases of inflammatory adhesions found at the operation, where it was not known that any had existed. In one case he was fortunate enough to find a little papilloma, not as big as the end of the finger, starting out of the ovary. When the uterus is adherent no other method can be so good, as this is the most direct way of dealing with the adhesions.

3. The mechanical advantages of his suspensory operation, acting directly on the posterior surface of the retroflexed fundus, are better than if the organ were held forward by pulling on the round ligaments on both sides.

4. Probably the best reason of all is the remarkable statistics of two hundred cases without a single death and with but one recurrence of the displacement—and that in a patient in whom a tube and an ovary were removed at the same time.

Suspension of the uterus is indicated in case of retroflexion which cannot be corrected or whose symptoms cannot be relieved by non-operative treatment, such as packing, massage, and pessaries. Dr. Kelly advises it in those cases of retroflexion which are more or less tied to the office of the physician by their ailment—patients who may go for years, better at times and then worse again for several weeks or more, and never feeling quite well.

He also urges suspension where the menstrual difficulties, backache and bearing-down pains, headache, loss of appetite, difficult defecation, and various general disturbances are persistent.

The classes just cited are easily recognized, because their pelvic symptoms are so prominent as to attract attention at once; but there is another class of neurasthenics equally important, whose local symptoms may be more or less in abeyance, and the first impression is that the neurotic condition is primary and fundamental and the local disturbance merely accidental. There is no class of cases where a good professional instinct and good judgment come into better play in selecting the suitable case and rejecting the others.

In a woman who is persistently neurasthenic, or in one who after repeated building-up efforts persistently falls back into a morbid neurotic state, where there is a retroflexion or retroposition, with definite pelvic disturbances becoming more marked at the menstrual period, the author would without hesitation urge suspension.

The method of operation is as follows:

1. After due preparation, emptying the bladder, and anesthesia, the abdomen is

slightly elevated and an incision three to five centimeters long is made, beginning about two centimeters above the symphysis, down into the abdominal cavity.

2. The peritoneum is then caught with artery forceps on each side and drawn out. This is to prevent pulling in the peritoneum by the suspensory sutures and leaving none to close the incision.

3. The retroflexed uterus is then hooked up and lifted into anteflexion by means of two fingers carried into the wound.

4. One side of the incision is then elevated with two fingers, and the peritoneum and subperitoneal fascia caught with a curved needle carrying the suspensory silk ligatures. The amount of tissue embraced is about one-third of an inch wide and one-eighth of an inch in depth.

5. The ligature is then conducted through the uterus on its posterior face below the fundus, and finally through the peritoneum and fascia of the opposite side, when it is tied, bringing the uterus up snugly against the anterior abdominal wall. If the pelvis is deep and the uterus lies out of reach, it may be brought up and held in position, while passing the suture, by means of an elevator. This is introduced down into the pelvis in front of the uterus, which is pressed into it and held as against an artificial symphysis. As soon as the first stitch is passed, the elevator is laid aside. After tying the first suspension suture, the second is easily put in, entering and emerging on the abdominal wall just above the first and piercing the posterior surface of the uterus just below the first; when it is tied it increases the anteflexion.

6. The sides and front of the uterus are examined to see that no intestine is caught, and the omentum is drawn down.

7. The abdomen is closed. This is done by taking off the forceps and sewing up first the peritoneum with the finest silk, and then drawing together the fascia with one or two silver wire mattress sutures, finally closing the skin with a subcuticular suture of fine silk.

The patient may rise sooner, but it is better to keep her quiet for two or three weeks. It is not necessary to wear an abdominal bandage, and a pessary is never put in afterward.

It was necessary in one case to reopen the abdomen for a hemorrhage following the operation; this arose from the slipping of the ligature at the cornu uteri, the site of an amputated tube and ovary. There was no trouble from adhesions or incarceration of a knuckle of intestine in front of the uterus in any case.

Out of one hundred and thirty of these cases, carefully analyzed by Dr. George W. Edwards for Dr. Kelly, the results, within a few weeks of the operation, were: One hundred were reported well, twenty-six improved, four not improved. The recovery was interrupted by a transient mania in three cases; by bronchitis in three cases; by pneumonia in one case; by stitch abscess in three cases; by hemorrhage from a repaired outlet in one case; by dysuria in four cases; by hysteria in four cases.

The proportion between married and single women was about two to one.

The number of children born since operation is not given. There have been at least six pregnancies, and in but one was there any marked discomfort and dragging due to the attachments of the womb.

He does not know of any case in which the retroflexion has recurred after pregnancy.

There has never been a hernia in any case.

In women who have borne children, retroflexion is often associated with descensus and relaxation of the vaginal outlet. It is useless to expect relief in these cases by simply suspending the uterus—which, instead of being gently detained in easy anteflexion, simply drags on its attachments until they give way. In such cases the vaginal outlet must invariably be repaired too. Sixteen out of one hundred and thirty-three cases needed the vaginal repair. In going over his statistics it is surprising to find so few needing this double operation, and he estimates the percentages at present as certainly much larger.

In seven cases both tubes and ovaries were removed, being diseased; in nine cases one tube and one ovary were removed; in three instances he ligated either uterine or ovarian vessels; in two a myomectomy was performed; in one a nephropexy.

REMOVAL OF THE UPPER EXTREMITY TOGETHER WITH THE SCAPULA AND CLAVICLE.

OCHSNER, in the *Annals of Surgery* for December, 1895, reports a second case in which he operated for enchondro-sarcoma, which had undergone colloid degeneration at several points. The tumors were situated respectively in the region of the supra-spinatus muscle and at the end of the clavicle.

The operator followed, in the main, the

rules laid down by Paul Berger. An incision was made over the clavicle, the periosteum reflected, a broad blunt instrument being inserted between the periosteum and the clavicle at the junction of the internal and middle thirds. One blade of a pair of bone-cutting forceps was inserted between the clavicle and the retractor, and the former was easily severed. The outer portion of the clavicle was now elevated, the blunt instrument being left in place to support the periosteum and the underlying vessels. The subclavian artery could now be felt pulsating underneath the periosteum, and on lifting the latter together with the subclavian muscle the dilated vein was plainly exposed at a point directly in front of the middle scalenus muscle. The brachial plexus was easily separated above by means of blunt dissection with the finger. A catgut ligature was now passed around the artery and vein by means of fine blunt hemostatic forceps. A silkworm-gut ligature, which had been rendered perfectly soft and pliable by immersion in hot water, was passed around the vessels in the same manner, at a point a quarter of an inch above the catgut ligature. After tying both carefully, forceps were applied to the vessels an inch below and the latter severed between forceps and ligature. Now the flaps were formed by carrying the incision forward and downward to the middle of the axilla from the outer end of the original incision. A second incision was carried backward over the outer third of the scapula and downward to meet the anterior incision in the axillary space. The skin-flaps were dissected up rapidly, and then the soft tissues were severed rapidly first anteriorly and then posteriorly along the surfaces of the ribs, all bleeding vessels being caught instantly with hemostatic forceps.

There was almost no blood lost during the operation. A pad of moist gauze was placed underneath the entire surface of the flaps to prevent oozing while the wound was being sutured, and when this was almost completed the gauze was withdrawn and pressure made over the flaps by means of pads for the same purpose.

A rubber drain was inserted through an opening made in the posterior flap, and a second one through the lower angle of the wound.

The wound was dressed on the fourth day, when the drains were removed. It was healed primarily throughout, except at two points half an inch in diameter which had become necrotic, probably from pressure. The patient was in an almost perfectly normal condition throughout the recovery. He insisted upon being up and dressed after the fifth day. He was kept at the hospital for four weeks after the operation, for fear some injury might occur to him, especially on account of his convivial habits. He is still (Sept. 1, 1895) free from a recurrence, and is in better health generally than for years before his operation, probably because he has abandoned strong drink and has secured lighter labor, being now watchman at a railroad crossing.

In a considerable number of amputations near the shoulder or hip the writer has noticed that the patient is comparatively little shocked when the large nerves are severed with a sharp knife or catling, but very severely when they are cut with scissors. Consequently, he has been careful in this instance to use the former instrument, and with benefit to the patient.

In a former case he ligated with silk, and was annoyed several months later by having the ligature come to the surface; consequently he used catgut in this instance, and, in order to be doubly sure, applied a second ligature of silkworm-gut, which was left long so as to be withdrawn in case the end of the vessel became necrotic beyond the ligature, a condition mentioned by several operators. This condition did not occur in this instance, hence the ligature was simply cut short after the wound had completely healed.

Outside of the danger from septic infection —which can, of course, be practically eliminated in all well regulated hospitals—the danger in this operation comes from hemorrhage or shock. Following the explicit directions of Paul Berger, described above, hemorrhage can be controlled with comparative ease if the operator is not too meddlesome.

Making the section of the clavicle after reflecting the periosteum, one is not at all likely to injure the underlying vessels.

The brachial plexus can be separated from the blood-vessels with safety. Having done this, it is much wiser to apply the first ligature around both artery and vein and enough of the surrounding tissue to be entirely out of danger of wounding the vein, than to attempt to ligate the vessels separately. It is not difficult to separate the vessels from the underlying tissues by blunt dissection, permitting the passage of the ligature with blunt forceps or with an aneurism-needle. Later each vessel can be easily ligated separately.

This plan helps to avoid two dangers, viz.: injury to the vein, which may give rise to either hemorrhage or air-embolism; and shock caused by an unnecessarily prolonged operation.

All operators with whose views the author is familiar agree that the operation is indicated in all cases in which sarcoma involves the soft tissues of the shoulder-joint or the clavicle or scapula or humerus near the shoulder.

With the great tendency to recurrence after amputation for sarcoma of any portion of the humerus, it would seem best to perform this very radical operation even in cases suffering from sarcoma of the lower part of this bone.

THE PLANTAR WART.

DUBREUILH observes that warts on the sole have received scant notice in works on surgery and dermatology. Yet such are far from rare, and can hardly fail to attract the attention of those in whom they occur. Local injuries appear to play an important part in originating them. The starting-point may be a contusion. M. Bargues, a chiropodist of Bordeaux, blames the nails in shoes, too thin soles which do not protect the plantar surface sufficiently from inequalities of the ground, humps on old soles, too thick seams of stockings or socks. Neither Dubreuilh nor Bargues has noticed the coincidence of warts on the sole and on the hands. The localization supports the theory of traumatism. They occur most frequently under the head of the third metatarsal bone, where it is almost habitual to find a callosity more or less developed. They are also found over the head of the first or fifth metatarsal bone, or under the heel. These are the points of support of the arch of the foot, and, while callosities are common enough there, corns proper are rarer than on the toes. No situation, however, is entirely immune, and these warts may be met with on the plantar aspect of the toes, or on their points beneath the free border of the nails. Warts of the sole are in general single, or not numerous, yet Bargues has encountered a case of a woman whose feet were literally covered with warts, rendering walking nearly impossible.

A recent plantar wart exhibits a reddish, lenticular elevation, invested by a thin epidermis. Oftener at first sight it has the appearance of a large callosity, which is very painful. If this is scraped, the periphery is a hard, horny layer, semi-transparent, of an amber color. But the centre, in place of being dense and conical, is soft and depressible. The growth assumes the shape of a ring perforated by an opening which goes on enlarging in proportion to the depth to which the scraping is carried. The central portion is composed of a soft, horny, whitish tissue, which resists the knife or spoon like wet oakum. While the peripheral horny ring is homogeneous or stratified, the central part is fasciculated, and is made up of columns set vertically. Sometimes a black hemorrhagic point is seen; more frequently, if the erasion is continued, blood is seen to ooze from a number of capillary orifices.

Plantar warts are affected by changes of temperature and a moist state of the atmosphere, precisely as corns, but they are much more painful; they may render walking impracticable, and the sensitiveness is in no way lessened by superficial abrasion. This is because the lesion is much more voluminous than it appears, and extends deeply into the derma.

Curetting, after local anesthesia has been produced by the injection of cocaine, constitutes the most rapid and radical treatment. It is not difficult, after a breach has been made in the soft and elastic substance; and when all has been scooped out, a pot-like hole is left, one or two centimeters deep. The bleeding is free, but is readily arrested by plugging the cavity with iodoform gauze. The treatment should be carried out with antiseptic precautions, and the dressing should be of aseptic wool. Healing occurs readily, and at the end of a fortnight the hollow above mentioned will be completely cicatrized.

A careful histological investigation into the structure of these warts was made by Dubreuilh, which will be best studied in the paper itself, as it does not lend itself well to summarizing. He failed to find any microbe. —*Annales de Derm. et de Syph.*, Paris, May, 1895; *Edinburgh Medical Journal*, December, 1895.

CATHETERIZATION OF THE URETERS IN THE MALE.

GAITHER (*Journal of Cutaneous and Genito-Urinary Diseases*, December, 1895) calls attention to the fact that for many years it has been the aim of those interested in medical science to discover some method by which the exact condition of the kidney could be ascertained. Judging from the urine passed

by the patient, it was often impossible to tell whether the disease was in the urethra, bladder, or kidney. If the trouble were located in the kidney, the questions at once arose: Which kidney is affected? Is one kidney normal, or are both diseased?

Before the advances of modern surgery the answers had a value in reference to prognosis only; the treatment would probably have been the same under any circumstances. The catheterization of the ureters, the only method which could give a positive knowledge of the condition of each kidney, was believed to be impossible in the male. Many plans, varying in ingenuity and value, were suggested as a substitute for this operation. It was even attempted to compress one ureter by pressure on the abdomen, and then assume that the urine drawn from the bladder, which had been previously emptied, came from the opposite kidney. But as it could not be proved that one kidney had been completely shut off, the results obtained were of little value. To-day, with the steadily diminishing death-rate following nephrotomy and nephrectomy in properly selected cases, every conscientious surgeon should be confident of his position before any operation on the kidney is undertaken. The advances in electrical science have placed means at our command which could not have been thought of twenty-five years ago. The invention of the cystoscope by Nitze in 1879 gave the opportunity for the positive diagnosis of vesical and renal diseases. By finding the ureters and watching the jets of urine it was possible to estimate comparatively the amount secreted by each kidney, and to discover renal hematuria. In 1888 Brenner suggested that a cannula should be placed along the inferior portion of the cystoscope for the purpose of changing the fluid in the bladder without removing the instrument. Through this cannula he attempted to catheterize the ureters in the male, but without success. The late Dr. James Brown, of the Johns Hopkins Hospital, performed this operation successfully on June 9, 1893, using the Nitze-Leiter cystoscope with Brenner's modification (*Johns Hopkins Hospital Bulletin*, September, 1893). He met with many discouragements while perfecting the catheter, stylets, etc., but his indomitable persistence finally achieved the success he merited.

The methods here given are those introduced and practiced by the late Dr. Brown

The shaft of the cystoscope used is elliptical, having a circumference equal to a No. 28 F. sound. The vesical end of the cannula is separate from the shaft, curving downward when the cystoscope is in position in the bladder. The operating-table should be 92 centimeters high, with an extension on the top 45 centimeters wide, projecting 40 centimeters. The patient lies on his back, with his buttocks on the end of the projecting board, the legs being widely separated and resting on stools 64 centimeters high. This allows the operator room for his knees, as he sits on a stool, which can be adjusted to any height desired, in order to bring his eye on a level with the cystoscope.

Both the surgeon and the patient should be in a comfortable position, for the instrument must be held perfectly steady in searching for the ureter and (after the catheter has been introduced) while waiting for the urine to be secreted and collected.

The urethra having been irrigated with a 1:40000 bichloride-of-mercury solution, 2 Cc. of a four-per-cent. solution of cocaine are injected into the deep urethra, and 4 Cc. into the anterior. As a rule, cocaine gives satisfactory anesthesia, but it is sometimes necessary to use ether or chloroform. In one case that could not be catheterized with cocaine the operation was easily performed under chloroform.

The bladder is washed, through a metal catheter, with a solution composed of Thompson's fluid with enough salt added to make a normal salt solution. Thompson's fluid is composed of borax one part, glycerin two parts, water two parts; and 300 Cc. are added to a flask containing 2000 Cc. of sterilized water. The solution is allowed to run in by siphon from a graduated jar, and care is taken not to overdistend the bladder; when it returns clear, the bladder is emptied, and from 100 to 300 Cc. (according as the capacity has been determined during the preceding irrigation) are introduced.

In one case, that of a man suffering from paralysis of the bladder of ten years' duration, it was not possible to find the ureters with 150 Cc. in the bladder, but when 250 Cc. had been introduced they were in plain view and easily catheterized.

The electrical power for the light is obtained from a four-cell storage battery made by the Southern Electric Company.

The shaft and beak of the cystoscope are immersed in a jar containing a five-per-cent. carbolic acid solution for one hour before being used. The catheter is wrapped in a towel saturated with 1:1000 bichloride-of-

mercury solution. The connections should be made, and the light tried with the cystoscope in the jar, just before introducing it into the bladder. By determining the distance to which the rheostat must be turned to give a perfect view in a clear medium, and not going beyond this point, a comparative estimate of the amount of renal hematuria can be made by noting the time taken for the fluid in the bladder to become opaque. The cystoscope, having been lubricated with glycerin, is introduced, and absorbent cotton wrapped around the ocular end to take up the few drops that will escape between the time the stylet is removed and the catheter inserted. The objection that the fluid escapes in such amount as to make a material difference has not been found true. If the cotton is pressed tightly into the cannula after the catheter is in the ureter, the leakage will be completely stopped. The ureter of the suspected kidney is first sought, as, in case much time must be lost in finding it, and the urine from only one side can be obtained, it is desirable to have that from the probable seat of the disease.

If the ureter is not easily found, it may be located by occasional jets of urine shooting across the window, or by a swirl of blood if the case is one of renal hematuria. The ureter may present at such an angle as to make the introduction of the catheter impossible. The presentation can be changed by raising or lowering the patient's leg, or it may be necessary to increase or diminish the amount of fluid in the bladder. When ready to catheterize, the stylet is withdrawn and the catheter quickly slipped into the cannula. The main difficulty to be overcome is to make the tip of the catheter take a sharp enough bend to enable it to engage in the mouth of the ureter; otherwise it slips over and along the bladder-wall most provokingly. Nitze's latest cystoscope is designed for the necessary curve, and is freely movable over the optical portion of the cannula in any direction without changing the focus, which greatly simplifies and facilitates the operation.

The ureter, in entering the bladder, passes obliquely for two centimeters between the muscular and mucous coats. As the catheter is pushed in, it can be distinctly seen running under the mucous membrane until it leaves the bladder. It is introduced eight centimeters, and, while in the ureter, is kept under continuous observation. In irritable bladders the tenesmus may bend the catheter almost to a right-angle.

The first drops appear in from one to five minutes, and are allowed to escape, in order that the bladder fluid may be washed out of the catheter. The flow is intermittent and irregular in amount. Fifteen or twenty drops may come in quick succession, followed by a few drops after an interval of from forty-five seconds to a minute and a half. A sterilized test-tube receives the urine, and in from five to ten minutes enough can be collected for the purpose of analysis. If the urine does not flow freely, it can be accelerated by pressure over the kidney downward along the course of the ureter. The Nitze-Leiter cystoscope can be used continuously if the current is turned off for one minute at the end of each ten minutes. After an hour's use the fluid in the bladder will not be found uncomfortably warm.

It is essential in all cases, in order to catheterize the ureters, first, that the bladder shall be capable of holding sufficient fluid to bring the mouths of the ureters into view; second, that cystitis or hematuria do not exist to such a degree as to render cloudy the fluid introduced into the bladder before a reasonable time has elapsed. If these conditions are complied with, almost every ureter can be catheterized. Repeated attempts may be necessary if the catheter does not have the proper curve, or if there should be great vesical tenesmus.

In one instance — a man with suspected pyelitis — although the ureters could be brought into plain view, and the catheter was repeatedly put against the mouth of each, it was found impossible to introduce it. Both ureters were surrounded by a circular ulcerated area with a radius of about five millimeters. Cocaine anesthesia was used, but the patient suffered considerable pain, and, after about ten minutes' futile effort, refused to allow the examination to proceed further. He would not submit to an attempt under chloroform, and left the hospital without a positive diagnosis having been made. Possibly there was a stricture at the mouth of each ureter, but the appearance on one side was that of an exceptionally patulous entrance. This was the only case in which it was impossible to catheterize the ureters when the vesical and renal conditions were favorable. On several occasions the ureter could not be located at the first attempt, even after diligent and protracted search, and the possibility of this embarrassing complication must be considered in estimating the chances of a successful catheterization. If general

anesthesia is used, the operation can be more easily and quickly accomplished. No great amount of skill is necessary, but one must have knowledge of the appearance of the normal bladder through the cystoscope, the position of the ureters, etc., which can only be acquired by considerable experience. Consequently, the operation will probably not become popular among surgeons generally.

In chronic nephritis the catheterization of the ureters is of the greatest value in establishing a correct prognosis. If the disease is found to be in one kidney, with the other normal or only slightly involved, the outlook is favorable. This condition would explain some cases which are seen clinically, in which the urine is loaded with albumin and tube-casts, but which go on for years without developing serious constitutional symptoms. The information obtained from catheterization will prolong many lives, by preventing the surgeon from operating when evidence of advanced disease on both sides is determined; and also by urging an immediate operation when one kidney is normal, with a pyelitis or pyelo-nephritis on the other side, exhausting the patient's vitality more and more each day. If one kidney is slightly diseased and the other considerably, it will influence the operator to do a nephrotomy instead of a nephrectomy, thus leaving the gland to aid its less crippled fellow, and possibly turning the balance on the side of life. By following the methods which are now opened to us, the percentage of fatal results after operations on the kidneys should be still further lowered.

The time has arrived when no renal surgery should be attempted until after the surgeon has obtained accurate and positive knowledge of the condition of each kidney by means of the catheterization of the ureters.

RUPTURE OF THE LIVER.

BRYANT (*Lancet*, Nov. 9, 1895) concludes an article on this subject with the statement that in the diagnosis of rupture of the liver there are no special symptoms which can be accepted as indicative of its existence, although severe shock and collapse as immediate results of a forcible local injury to the right side of the abdomen or to the lower part of the right side of the thorax should always suggest it; and even when the same kind of injury to the same regions is unattended by any such serious symptoms the surgeon should be alive to the possibility of a limited rupture of the liver, and should treat the case accordingly. The cases quoted afford ample evidence to support this proposition, and are more than enough to show the possibility of serious mischief to the liver in spite of an absence of serious general symptoms, when the nature of the injury has been such as to render it probable that such an injury may have been sustained. Had such a possibility been a prominent thought in the minds of those who had the treatment of the cases the writer quotes, the cases themselves, he believes, would not have been in his possession, since a recovery might have been secured in the majority of them.

With respect to the diagnosis of rupture of the spleen, the remarks just made with reference to the liver are equally applicable. It is to be recognized that cases of limited rupture of this organ, as of the liver, are quite reparable, as illustrated by Preparation 2018 in the Guy's Hospital Museum, taken from a body seven days after the injury; and that when such cases recover, they have, most probably, been regarded as examples of local traumatic peritonitis. In a case reported by the author, there was no suspicion of such a form of injury being present, and it was not till a fatal termination of the case by an acute peritonitis that an opportunity of finding out its cause was afforded to the surgeon. When a severe laceration of the spleen has taken place, death from shock and collapse due to hemorrhage is the common result. When the laceration is limited, the case may be overlooked and regarded as one of peritonitis. The cautious surgeon should, however, in all cases of injury from any local force applied to the left hypochondriac or lower thoracic region, whether with or without general symptoms, have the possibility of its presence before his mind, and this possibility, however remote, should always lead him to treat his patient with the same care and precaution as if, indeed, he felt sure this kind of injury existed. The observance of such care, under all circumstances, must be beneficial; its non-observance may be fatal.

Rupture of the stomach, when complete, is a very fatal injury, shock and irrecoverable collapse, as a rule, speedily following the escape of its contents into the abdominal cavity. When incomplete — that is, when only its mucous lining or peritoneal covering, with or without the muscular coat, is involved—recovery is not impossible. When the external injuring force is applied to the fully distended stomach, a rupture is more likely to take

place than when the stomach is empty, and this rupture may be either complete or incomplete. In the last case reported by the author it is reasonable to suppose that the rupture had been incomplete and had not extended sufficiently far to allow of extravasation of stomach contents, for no blood was vomited, although the stomach rejected food, and there were no primary symptoms to indicate any injury to the organ.

In the Guy's Hospital Museum there is a preparation (No. 592) showing a laceration and detachment of the mucous membrane of a stomach over an area of about two inches, extending transversely around the middle of the organ to within an inch of either side of the greater curvature. It was taken from a boy of nine years, who had been run over by an omnibus and who shortly after admission vomited a blood-stained fluid, dying the next day; in addition to the stomach injury, there were found laceration of the liver, extrasavated blood behind the pancreas, and a broken thigh. There is likewise a second preparation (No. 594) showing two extensive lacerations in the peritoneal and muscular coats of the stomach and a very slight tear in the mucous membrane; it was taken from a man who was brought into the hospital dead, having fallen thirty feet on to the deck of a vessel.

That the incomplete separation and laceration of the mucous coat of a stomach, as revealed by the specimen at Guy's Hospital, are clearly possible, is an important fact; and there is good reason to believe that the same accident may occur to the intestines, and even to the bladder, and that persistent or intermittent hemorrhage from either of these organs following injury should suggest its presence. Thus, a man aged thirty-nine fell thirty-five feet, striking upon his abdomen, and subsequently passed blood with his dejecta for seven consecutive days, associated with local tenderness over the colon, and then recovered. The author suspected laceration of the mucous membrane of the colon, and upon such a diagnosis treated him successfully. And in a boy about fourteen years of age, who fell from a height upon his perineum and subsequently had hematuria, and passed fresh clots and pure blood with his urine for some days, accompanied with pain, when there were no indications of urethral or renal mischief, the same diagnosis was rendered probable. At any rate, when, as a result of an abdominal injury, blood is found in small quantities at intervals, the probability of this symptom being due to a rupture of the mucous lining of the stomach should be entertained, and the treatment of the case modified by this opinion.

TREATMENT OF DISEASES OF THE SIGMOID FLEXURE.

BAUGHMAN (*Mathews' Medical Quarterly*, October, 1895) calls attention to the fact that the sigmoid flexure is more liable to a train of disturbances than any other portion of the colon, from the fact that it is the storehouse or receptacle where the feces are retained until their expulsion in the act of defecation. The rectum is almost entirely devoid of feces, except just at the time of and just before defecation. The fecal mass is retained in the sigmoid flexure until certain periods, when it descends into the rectum, producing a desire to go to stool, and if this desire is not gratified the mass of feces is lifted back into the sigmoid, where it remains until another desire for defecation; and even if all the fecal mass is not expelled from the rectum the remaining portion is lifted back into the sigmoid, where it remains.

The powers of the colon for absorption are very great, and all of the watery portion of this retained fecal mass is soon absorbed into the system and leaves a dry, hard mass in contact with the tender mucous membrane, which often brings on a train of diseases of this part that, unless relieved by appropriate treatment, results in confirmed invalidism.

While part of the functions and diseased conditions of the entire large intestine are similar, the sigmoid has various functions to perform and is the prey of various diseases that we seldom or never have higher up in the gut, but at the same time it is almost impossible to clearly separate them in diagnosis and treatment. The sigmoid flexure is more often the seat of obscure abdominal disease than has generally been suspected, and if we would pay more attention to the rational and common-sense treatment of the sigmoid we would get more cures and clear up many of these troubles. There are a great many cases of chronic diarrhea and chronic dysentery that go uncured for years and cause the patient untold suffering, and finally result in death, which, if located in the sigmoid flexure and given appropriate local treatment, would be cured. This is true to a great extent of the entire colon.

The various troubles in the sigmoid are

inflammation and all its attendant evils, beginning with congestion, and too often terminating in ulceration, stricture, and cancer. It is very often impossible to diagnose just what the trouble is. The symptoms are often vague and misleading, and only by the most painstaking examinations are we led to the truth. We most frequently have diarrhea, but on the other hand we frequently have constipation. Deep pressure over the left iliac region will generally elicit some pain if there is any serious disease in the sigmoid. It is very difficult to arrive at any positive conclusion as to tumors in this region, unless in the case of a very lean patient. We generally find vague pains through the abdomen and thighs, also in the bladder, uterus, and prostate, with disordered action in these parts. The most positive conclusions are obtained from the fecal evacuations. The patient generally complains of passing a great deal of matter at each evacuation, and often suffers pain in the lower part of the abdomen just before evacuation, and this pain is worse in the left iliac region. The physician should invariably see the evacuation, for the statement of the patient is often misleading, and it is from the nature of the evacuations that we are to learn most in our diagnosis. If we find that the discharges contain much mucus and no pus, we may be pretty sure there is no ulceration, but only a congested state of the mucous membrane, with perhaps a beginning inflammation. To say just where congestion ends and inflammation begins is a very nice point in diagnosis, and one that is not often attained. If there is pus in the discharges, we know we have to deal with a severe form of inflammation, and most likely ulceration; if blood and pus, we may feel very certain there is ulceration in some portion of the large intestine, and the chances are that if ocular and digital examination has shown the rectum to be healthy, this trouble is located in the sigmoid. If there is no specific trouble and nothing to indicate malignancy, these various divisions of congestion, inflammation and ulceration will be of great service to us in our prognosis.

A simple congestion should, as a rule, yield to appropriate treatment. If the disease has existed for some time, we generally find emaciation, and if there is much ulceration the sufferer is completely exhausted after each evacuation, of which there are often eight to ten in the twenty-four hours, containing mucus and pus.

The best treatment for a simple congestion or inflammation of the sigmoid flexure is, to begin with, an aperient of some kind, preferably sulphate of magnesia, and after the bowels have been thoroughly evacuated to introduce a Wales rectal bougie, No. 5, until it passes into the flexure, and then with a household or Davidson syringe, with the nozzle tightly fitted into the cavity of the bougie, to inject about half a gallon of hot water holding in solution from half an ounce to an ounce of boric acid. This should be retained five or ten minutes, and the injection repeated every twenty-four hours. The patient should also take but a moderate degree of exercise. A soft diet should be enjoined—oysters, milk, coffee, mush, soft-cooked eggs—with a very small amount of bread and but very little if any meats. Salol is a good internal antiseptic, but if there is any tendency toward diarrhea one drachm of subnitrate of bismuth should be given often enough to keep the bowels from acting more than once in the twenty-four hours, and the patient should go to stool just after the morning meal. After two or three days the bismuth will only have to be taken once a day, and then once in two days. It is claimed that the bismuth reaches the colon unabsorbed and acts as an antiseptic. Its healing qualities are well known.

The injections of hot water and boric acid should be kept up for five or six days, when the mucous membrane of the intestine will be in condition to receive a healing application. One to two drachms of fluid hydrastis should be diluted in two ounces of warm water, and injected into the sigmoid, the patient being kept very quiet for from one-half to one hour after, so that the medicament may remain for an indefinite time in the sigmoid. Once in twenty-four hours is often enough for this application.

After a few days it is well to use an injection of almond oil, iodoform, and subnitrate of bismuth, instead of the hydrastis; one ounce of the oil, with eight grains of iodoform and one drachm of bismuth, is about right for a single injection, and this may be kept up daily for some time, occasionally alternating with the hydrastis. It is well occasionally to wash out the bowel with the hot water and boric acid.

Most cases of a simple inflammatory character in the sigmoid may be cleared up by this treatment, and many cases of chronic diarrhea, dysentery, and constipation of years' standing may be cured, provided the inflammatory process has not produced organic changes that are beyond relief.

HOW TO AMPUTATE.

Under this title, in an eminently practical paper, WYETH (*New York Medical Journal*, Nov. 16, 1895) brings forward some points which he has evidently learned from hospital experience. He holds that hemorrhage is the chief factor of shock, and that to prevent loss of blood is essential. He usually considers the tarsus and the metatarsus as a single bone, paying no attention to joints, taking the precaution to remove any thin film of bone or cartilage which may still remain when the saw passes close to one of the articulations. The only exceptions to this rule are: *first*, in the matter of an amputation at or near the ankle-joint. From experience he believes a better degree of usefulness can be obtained by a properly adjusted artificial foot to the stump of a Symes amputation than to one which saves either a portion of the os calcis (Pirogoff), or when part or all of the astragalus is left in (Hancock). From the ankle to the hip the same conservative idea should prevail, unless, *second*, the line of the saw passes within an inch of the knee-joint or above the trochanters—in these conditions it is conservatism to remove the upper end of the tibia and amputate at the knee-joint, or to enucleate the head of the femur.

Of seven hip-joint operations performed by the author he has lost but one, and this not from hemorrhage. When, as in amputation at or near the ankle-joint, a rubber tourniquet is applied at or near the thigh, care should be taken to use a wide rubber band and not a rubber tube, since the accumulated pressure of the rubber tubing is sometimes great enough to injure the nerve. The author has seen paralysis follow in several instances as the result of traumatic neuritis caused by the tourniquet. In high amputations near the shoulder or hip, this objection does not prevail, since pressure on a nerve is immaterial at these points.

In performing the Symes amputation he carries the incision from the tip of the malleolus on either side directly downward parallel to the axis of the leg, the foot being held at right-angles to the leg, thus avoiding sloughing of the inner side of the flap, because the posterior tibial artery, particularly the external plantar branch of it, is not interfered with by this incision. In general amputations of the leg or arm a circular skin-flap with or without lateral incision, as the emergency demands, is the ideal flap, the muscles being divided an inch or more above the level of the circular incision through the skin, and the bone sawed on a level with the muscle. Dissection of the periosteum from the end of the bone in order to secure a periosteal flap is entirely unnecessary and should not be done.

In certain cases of amputation, when osteomyelitis has prevailed, it was thought that the surgeon might be called upon to carry his amputation high up, close to the shoulder or hip-joint, in order to get above the disease in the bone. This is not good surgery, for the longer the limb the more useful to the patient, and bones that are the seat of osteomyelitis can be readily cured, provided the canal is opened even near the knee or elbow-joint and the bone carefully curetted up to the end of the canal. The insertion of a drainage-tube through which aseptic irrigation is made every day or two, and the gradual withdrawal of the tube, will cure the disease in the bone and leave the stump long and useful.

He states that another point has been of great service to him in effecting rapid amputation. When making a hip-joint amputation or an amputation through large masses of muscular tissue, after tying large arteries, such as the two femorals and the circumflex branches, in order not to lose time that is usually spent in applying forceps to oozing surfaces, he passes deep catgut sutures through great masses of muscle all the way across the whole cut surface, and ties these firmly. In this way the muscles are brought together and compression exercised which prevents bleeding. Ten or fifteen minutes can be saved by this practice in an ordinary amputation.

In hip-joint amputation, he states, complete control of hemorrhage can be obtained by carrying the strong white rubber tubing close in the crotch, where it is held by the inner pin, while the other pin is so inserted that the tube passes in the notch just below the anterior superior spine of the ilium, from which the sartorius muscle originates. In this way the pressure is entirely above the level of the hip-joint, the capsule can be opened, and disarticulation rapidly effected without any attention to the tourniquet. If the tourniquet is not tightly applied, when the bone is removed and the rubber tubing is slackened by diminished resistance there may be some slight dripping from the vessels in the posterior part of the flap; but this is of no consequence, and can be promptly controlled by pressure with the fingers and application of artery forceps.

SEVENTEEN CASES OF CHRONIC (RELAPSING) APPENDICITIS, TREATED BY OPERATION.

HUNTER MCGUIRE (*Medical News*, Nov. 30, 1895) reports seventeen cases of relapsing appendicitis treated by operation. He makes a clean cut straight down in the most prominent part of the swelling, if there is any; and over the supposed site of the appendix if there is no swelling. This incision is almost transverse, beginning near the anterior superior spinous process and running inward and slightly downward toward the outer border of the rectus. He holds that this transverse incision lessens the subsequent danger of hernia. The incision is not more than two inches long in the skin, and narrower as the cavity is reached. The peritoneum is opened most cautiously, as a piece of omentum, or, more important, a portion of the gut, may be adherent and in the line of incision. All adhesions are freed, and the appendix is removed in the ordinary manner. Iodoform is freely dusted over any injured places in the peritoneum. Gauze drainage is introduced when necessary, and the wound closed with a continued fine silk suture for the peritoneum, and silkworm-gut for the muscles, fascia, and skin. There was one death.

DIAGNOSIS OF RENAL CALCULUS IN WOMEN.

KELLY (*Medical News*, Nov. 30, 1895) reports three cases in which he diagnosed the presence of renal calculus by means of instrumental exploration through the ureters.

By renal catheters he demonstrated a unilateral or bilateral pyelitis, and the grade of each.

By suction at the outer end of the catheter he brought down bits of stone for a microscopic and microchemical examination.

The color of these pieces of stone signified a long retention in the pelvis of the kidney.

A piece of stone, black and rounded on one side, and light-colored and jagged on the opposite, was evidently broken off from a larger calculus and caught in the eye of the catheter by friction and suction.

The bruised end of the catheter was conclusive evidence of violent contact with a hard body.

SPLENOPEXY.

The substitution of fixation in place of extirpation of wandering spleen is such an entirely rational method of treatment, that PLUCKER (*Cent. f. Chir.*, No. 40, 1895), in the belief that cure cannot be effected by simple fixation of the parietal peritoneum, devised and practiced the following method on a man of twenty-three years. The patient was placed in the Trendelenburg position and an immediate opening made. The spleen was found in the true pelvis, enlarged, thick, and very movable. The patient having been placed on his right side, an incision four inches long was made in the middle axillary line over the crest of the ilium and the lower border of the ribs. A second incision was carried at right angles to this and parallel to the tenth rib, and of equal length. The cuts divided all the soft parts down to the peritoneum; the musculo-cutaneous flaps were reflected; the peritoneum was loosened above and below from the tissue to which it was attached by means of the retro-peritoneal fat and connective tissue, and a very small incision (just large enough to allow the spleen to be extruded) was made in this membrane. The spleen was now pressed from the belly through this opening, and secured in the retro-peritoneal region. A line of suture placed circularly about the peritoneal opening narrowed the latter and fixed the parietal peritoneum to the vascular and ligamentous pedicle of the spleen. The spleen now occupied its normal position, excepting that it was to the outer instead of the inner side of the peritoneum. To secure it in this position a thread was thrown around the tenth rib and secured to the lower pole of the spleen. This thread was at once tied by a line of suture, including the divided fascia below the tenth rib and the retro-peritoneal connective tissue and fat, so that the spleen was enclosed into the peritoneal pocket behind. A few interrupted sutures secured the upper portion of the spleen, and finally the thread thrown around the tenth rib was secured. This operation is not dangerous, is quickly performed, and gives permanent results.

CASE OF PERFORATED GASTRIC ULCER; LAPAROTOMY; GASTROSTOMY; RECOVERY.

PAUL (*Medico-Chirurgical Journal*, No. 29, 1895) reports a case of gastric ulcer in which he successfully operated. The patient was thirty-one years of age and had suffered for a number of years from dyspeptic symptoms. Notwithstanding her constant pain and the advice of her doctor, she took a cold-meat supper, which was followed by vomiting,

along with the most agonizing pain in the abdomen. The patient was found in a condition of most profound collapse, from which she rallied after some hours. Operation was begun nine hours after the onset of the first symptoms. An incision four inches long was made between the ensiform cartilage and the umbilicus. As soon as the peritoneal cavity was opened, sour-smelling gas and greenish liquid escaped, and the neighboring viscera showed signs of commencing peritonitis. The ulcer, though in a most awkward position, was easily found, on account of its very large, hard and thick base, which made it feel like a malignant infiltration. It was located at the cardiac end of the lesser curvature, and it required some tension to keep it in view, even although the left rectus muscle was cut across to the margin of the costal cartilages. The rent was transverse, and measured about half an inch in length. Closure was extremely difficult, but was accomplished finally and reinforced by a tag of fatty omentum. The stomach was drained by the introduction of a glass tube, as recommended for gastrostomy. The patient suffered from hemorrhages from the stomach and from diarrhea, and had a protracted convalescence. When the stomach-tube was removed, the opening closed.

Paul states that the cases reported since Mr. Gould opened a discussion on this subject at the Bristol meeting of the British Medical Association, all tend to confirm the views he expressed, both as to the causes of failure and the best means to attain success. The former may shortly be stated as: (1) collapse; (2) imperfect cleansing of the peritoneum; (3) further leakage of stomach contents. Fatal collapse is to be avoided by operating in the stage of reaction before peritonitis has fully developed. Operation should be as short and simple as is consistent with the object in view. The peritoneum is best cleansed by thorough flushing with hot water at a temperature of about 100° F. Peritoneal drainage is better not resorted to, except in those cases where peritonitis is fully established, and most of these will die anyway. The third cause of failure—further leakage—is generally due to the inaccessibility of the ulcer, and the best means to be taken to avoid it have not yet been agreed upon. When the orifice can only be imperfectly closed, it may prove wise to drain the stomach by a temporary gastrostomy. When it is quite inaccessible, it might possibly be sutured through an incision in the anterior wall of the stomach. It is not every ulcer that could be got at, even in this way. The readiest way of meeting the difficulty was adopted by Mr. Maurice, of Reading, when he introduced an india-rubber tube into the stomach through the perforation, and packed it round with gauze. Washing-out of the stomach is not generally a desirable proceeding.

The author holds that many cases of gastric ulcer can be traced to the use of corsets.

RETROVERSION OF THE UTERUS.

BOISE (*American Journal of Obstetrics*, November, 1895) advocates the following operation for this condition:

First (the vagina having been thoroughly disinfected), drawing the cervix forward until the sacro-uterine ligaments are made as tense as possible; denudation of vault of vagina in a direction corresponding to the ligaments to as great an extent as may be necessary; passing a large curved needle from one end of the denudation to the other, through the longitudinal axis of the ligaments, armed with large or chromicised catgut, and leaving the ends of the catgut free (clamped by forceps) to be tied later.

Next, thorough redisinfection of the hands; opening the abdominal cavity through one of the recti muscles, care being taken to separate the fibres of the muscle without cutting or tearing; breaking up the adhesions carefully; treating the appendages according to indications, care being taken not to injure the round ligaments; then temporary covering or closure of the abdominal wound. After this, opening the inguinal canals and drawing the round ligaments forward as far as may be necessary, care being taken not to have them too tense; then careful, accurate closure of the divided fascia by interrupted sutures of sterile chromicised catgut or kangaroo tendon, passed through the ligaments in such a manner as to hold them in close apposition to the under surface of the united edges of the fascia. These sutures should be tied securely and left buried by closing the integument with continuous catgut suture, subcutaneous if preferred.

The position of the uterus should be verified through the abdominal wound before the sutures which fasten the ligaments in the inguinal canals have been tied.

Closing the abdominal wound by a continuous catgut suture which unites the peritoneum; by interrupted catgut sutures (chro-

micised), or by kangaroo tendon, passed through the fascia, by which its edges must be carefully approximated; and, lastly, closing the integument as in the inguinal wounds.

The fibres of the recti muscles may be drawn together by sutures or not, as desired; generally they will be brought closely together by the sutures which unite the fascia.

Finally, tying the vaginal sutures and thus drawing the cervix back to its normal location.

By this procedure the uterus will be placed in a position as nearly anatomically and physiologically normal as possible.

A CASE OF TRAUMATIC TETANUS TREATED WITH TETANUS ANTITOXIN.

W. Wray Grayson (*Pittsburg Medical Review*, October, 1895) reports a case of traumatic tetanus successfully treated by tetanus antitoxin. A child, six years old, was wounded in the foot by a wire nail, developing the first symptoms of the disease on the seventh or eighth day following. The early symptoms were: malaise, followed by stiffness of the jaws and muscles of the back of the neck, and strong flexion of the toes of the wounded foot. The following five days the disease made slow progress, and when first observed by Grayson the pulse was 115, the temperature 100.5°, patient complaining of pain in the back of the neck and on attempting to bring his head forward; also epigastric pain, and difficulty in swallowing; right foot in talipes equinus position; mouth could be opened an inch or more, but not without pain; tongue wounded in several places. The child was purged and given small doses of chloral and bromide. The following three days he became gradually worse, the temperature reaching 101.5°; the paroxysms of painful spasm were frequent, and a tendency to general opisthotonos developed. Twelve days from the first onset of the disease, antitoxin was administered—pulse being 88, temperature 98.8°. The patient having been placed moderately under chloroform, 10 Cc. of the serum was injected into the left buttock. The next day it was noted that the paroxysms, though frequent, were less severe, and that he slept better. A second, smaller, dose of the serum was given under chloroform; the patient had but one paroxysm in the twenty-four hours following. Five cubic centimeters of serum was then given; there was no pain; no paroxysm. Another 5 Cc. was followed by a steady improvement. On the following day the final dose was administered. The foot remained extended for some time, but could be flexed without pain. The patient convalesced steadily. About a week later a papular eruption appeared on the face and arms and finally extended over the entire body.

[It should be remembered in connection with this case that tetanus which is not fatal very soon after the attack begins frequently permits the patient to recover, so that this test is not as positively in favor of tetanus antitoxin as would appear at first glance.—Ed.]

THE OPERATIVE TREATMENT OF CONGENITAL DISLOCATION OF THE HIP.

Hoffa (*Berliner Klinik*, June, 1895) reports the results of his operation for congenital dislocation of the hip, which consists in exposing the joints, deepening the cotyloid cavity, and placing the head of the femur in its normal position. He describes also the different modifications in the technical details of his procedure which he has adopted from time to time. This paper deals with the results of one hundred and twelve operations performed on eighty-two patients, thirty of whom were affected with bilateral, and the remaining fifty-two with unilateral, dislocation. In three of these cases death occurred as a direct result of the operative treatment, having been due in two cases to prolonged anesthesia with hemorrhage and shock, and in the third instance to iodoform poisoning. These disasters led the author in subsequent operations to perform the operation more rapidly in order to avoid chilling of the patient, to refrain as far as possible from division of muscles, and to substitute simple sterilized gauze for iodoform dressings. In nine cases the operation was followed by anchylosis of the affected hip. This unfortunate result is attributed in eight of these instances to suppuration in the wound. In the remaining cases of recovery in which the treatment resulted in the establishing of a freely movable joint, there was no subsequent tendency to stiffness of the hip, either from adhesions or from muscular contraction. In most cases, it is stated, the mobility of the limb increased steadily after the discharge of the patients from the hospital. Return of the luxation was noted in one case, in three the bone was displaced backward, and in eight forward. In the cases of backward

displacement the patients had been removed from the author's supervision before the completion of the treatment. The forward displacements he attributes to insufficient deepening of the cotyloid cavity; these occurred in his early cases. In instances of unilateral dislocation the operation is followed by decided lengthening of the affected limb, in consequence of the restoration of the head of the femur to its normal level. The amount of persistent shortening due to deformity of the neck of the displaced bone is not very great, and may be obviated by obliquity of the pelvis and by the use on the affected side of a boot with a thicker sole. In cases of bilateral dislocation the author states that his operation results in a removal of lordosis, in a reduction to a minimum of the waddling gait, in restoration of the normal direction of the limbs, and in increased abduction mobility. It is asserted that in all cases of successful operative treatment by this method the improvement persists steadily from the period of convalescence and increases from year to year. The best possible operation in cases of congenital dislocation of the hip is one which will enable the surgeon to effect complete reduction of the displaced head of the femur and to establish a movable joint. The author insists on the necessity of preserving the continuity of the muscles of the joint and of restoring their healthy condition and contractile vigor. In recent modifications of his operation he refrains as far as possible from cutting the contracted muscles, and in his after-treatment he attaches great importance to electricity and massage.—*British Medical Journal*, July 13, 1895.

Reviews.

WOOD'S MEDICAL HAND ATLAS OF OPHTHALMOSCOPY. With an Introduction to the Use of the Ophthalmoscope. By Prof. O. Haab, M.D. Translated and edited by Earnest Clarke, M.D., B.S. (London). New York: William Wood & Co., 1895.

Since the appearance of Yaeger's altas, a phenomenal work considering the then early youth of ophthalmoscopy, and the later work of Liebreich, no systematic collection of pictorial representations of the normal and diseased eye-ground has been published. The great value of these books, fulfilling every need, must be accepted as the reason, in these days of book-making, that the artistic ophthalmologists have resisted the temptation to add to their number. Yet in view of our more advanced pathology, more scientific classification, and increased knowledge of disease of the fundus, a new atlas based on the most recent additions to our conceptions of the various diseases should be warmly welcomed. Haab's work is essentially new. His drawings are pictures of actual conditions in patients seen by himself during life, and often microscopically studied after enucleation or death, and copied under his own directions. In his effort to represent a series of prevalent eye diseases that shall conform both to truth and to modern classification, he has been eminently successful. The old routine group of cases has been extended to include many conditions not heretofore represented, notably several of coloboma of the choroid, dislocation of the lens, papillitis of meningitis and of tumor of the brain, optic atrophy following division of the nerve, the retinitis of anemia and that of diabetes, syphilitic arteritis in the retina, conjunctival changes accompanying syphilis, old age, concussion, the entrance and lodgment of foreign bodies, and sarcoma of the choroid.

We note with surprise the omission of a description or delineation of one of the commonest diseases, namely, acute or chronic central retino-choroiditis of syphilitic origin. Haab has pictured several diseased conditions of the foveal regions which are not frequently met with, and omitted one of the most important.

Without exception the drawings are true and the colors natural. The artist has avoided the error common to his predecessors, of exaggerating contrasts by intense coloring, and has succeeded in producing lifelike representations. The German classification of diseases of the retina and choroid has been followed.

The introduction is a well written, easily understood description of the direct and indirect methods of using the ophthalmoscope, of retinoscopy and the errors of refraction, but not superior to those found in every textbook on diseases of the eye.

Mr. Earnest Clarke has been successful in his translation. He has confined his attention to presenting a careful literary version of the German text, with the exception of four figures taken from his book on Eye Strain in illustration of the direct method of examination.

The book is of convenient form, free from typographical errors, and neatly bound, and is by far the most desirable atlas of the kind published. H. F. H.

CUTANEOUS MEDICINE: A Systematic Treatise on Diseases of the Skin. By Louis A. Duhring, M.D. Part I. Illustrated.
Philadelphia: The J. B. Lippincott Co., 1895.

Dr. Duhring's name is instinctively associated, in the minds of the profession in America and abroad, with the best dermatological literature and the best original work in dermatology of the last few years, and we therefore examine with interest the first part, or fasciculus, of this work, which we are told in the preface has been written to take the place of the author's Practical Treatise upon Diseases of the Skin, a work that is largely patronized by his professional brethren and has been translated into French, Italian and Russian since its first publication.

Dr. Duhring has attempted, in re-writing his book, to deal with the subject entirely from a practical standpoint, and the work rests as a whole on clinical observations supported by pathology and pathological anatomy; the rapid strides made in dermatology during the last few years receive due notice. He emphasizes the necessity of regarding the skin as an ampler index of disease than it has been given credit for, both by the specialist and the general practitioner, while the opinions he expresses in regard to therapeutics are mostly based upon personal experience in hospital, dispensary, and private practice during a period of nearly thirty years. The text of this first part embraces the Anatomy of the Skin, the Physiology of the Skin, General Symptomatology, General Etiology, General Pathology, General Diagnosis, General Treatment, and General Prognosis, and the illustrations are nearly all of them designed to illustrate anatomical facts.

It is not often that the author of an eminently practical and unusually successful text-book has the courage or the conscience to sit down and re-write a *magnum opus* in order to place before us the views which he has gained by large experience, and Dr. Duhring and his text-book both deserve the success in the future which has been so freely given them in the past.

A MANUAL OF THE PRACTICE OF MEDICINE. By George Roe Lockwood, M.D. Illustrated.
Philadelphia: W. B. Saunders, 1896.

Text-books on medical topics are written with various objects—sometimes to exploit the original views, good or bad, of the author; sometimes to fill a vacancy which is believed to exist in medical literature; and again in order that the students who attend upon the lessons in medicine may have some volume which embodies the teacher's views or which covers the course he goes over year by year in his didactic and clinical lectures. It is the last object which has evidently stimulated the author to the compilation of this volume, for we do not find through its pages anything original, either in the text or in the arrangement of the chapters. He tells us in his preface that he has followed the classification or arrangement adopted by Dr. Osler, of Baltimore, in his well known text-book which we reviewed in our last issue. There are a number of colored plates in the book showing temperature charts, bacilli, and cross-sections of blood-vessels and organs. While many of these are admirable, they are nearly all derived from other and well known authors.

In regard to the diagnosis of uremia, we do not think that high arterial tension, scanty and albuminous urine, and the presence of fever are the three cardinal diagnostic symptoms, as one is led to believe if he follows the text.

Doubtless the volume will prove a safe guide to Dr. Lockwood's classes in the Woman's Medical College of the New York Infirmary, and as it was evidently written chiefly for this purpose the author has succeeded in accomplishing his end.

OUTLINES OF PRACTICAL PHYSIOLOGY: Being a Manual for the Physiological Laboratory, including Chemical and Experimental Physiology, with reference to Practical Medicine. By William Stirling, M.D., Sc.D. Third edition, revised and enlarged. Copiously illustrated.
Philadelphia: P. Blakiston, Son & Co.

As an evidence of the fact that the author believes in teaching not only by text but by pictures, we may mention that this volume, which is a small octavo of only 400 pages, contains no less than 289 illustrations, which are scattered through seventy-six so-called lessons or chapters. It is readily seen, therefore, that the book contains a very large amount of information condensed into a very small space, and affords one of the best laboratory manuals which can possibly be placed in the hands of the student of physiology who is fortunate enough during his medical course to find time for actual experimentation. Dr. Stirling has brought his text up to the most recent physiological advances, not only by his own work but also by carefully culling from recent standard authorities the latest facts, chiefly in physiological chemistry; and we trust that in the reorganization of medical teaching now going on in the United States, this book may receive the degree of patronage which its quality deserves.

THE AMERICAN YEAR BOOK OF MEDICINE AND SURGERY. Being a Yearly Digest of Scientific Progress and Authoritative Opinion in all Branches of Medicine and Surgery. Collected and arranged, with critical editorial comments, by sixteen collaborators, under the general editorial charge of George M. Gould, M.D. Profusely illustrated.
Philadelphia: W. B. Saunders, 1896.

This is a very handsome volume, large octavo, nearly 1200 pages, which the editor tells us in his preface is designed to give physicians an epitome of the new and progressive medical truths and suggestions made between the months of July 1894 and June 1895. The articles, as a rule, have been prepared by men who are recognized in their various branches of medicine as quite competent not only to make abstracts of the best articles concerning practical medicine and surgery, but also to criticise them forcibly and clearly. In most instances these gentlemen have been assisted by younger men, to whom has no doubt fallen most of the drudgery of the preparation of the articles. The book is characterized by the admirable quality of the illustrations, by the copious references to various authorities quoted, and by the admirable index of over fifty pages. Containing as it does a condensation of the best medical literature of the past year, it will prove a valuable volume to any practicing physician who may be wise enough to purchase it.

INTERNATIONAL CLINICS: A Quarterly of Clinical Lectures. Edited by Judson Daland, M.D., J. Mitchell Bruce, M.D., and David W. Finlay, M.D. Vol. II. Fifth series.
Philadelphia. J. B. Lippincott Co., 1895.

Looking through this volume, to which a large number of medical teachers have contributed, we are impressed with the fact that the general quality of the lectures is better even than that of preceding volumes. The chapters which seem to us of particular interest are those of Dr. Wharton Sinkler, upon "The Tendency toward Recovery in Certain Cases or Tabes Dorsalis," "A New Method of Infiltration Anæsthesia," by Dr. Schleich, and "Sympathetic Inflammation of the Eye, with Illustrative Cases," by Dr. G. E. de Schweinitz.

This series enables the physician far removed from medical centres to provide himself with information such as he could obtain by attending a course of good practical lectures in any one of the great hospitals or medical schools in this country or abroad, and for this reason we can readily understand why it is that the publication of these Clinics has proved so successful.

A HANDBOOK FOR HOSPITALS. By Abby Howland Woolsey. Third edition.
New York: G. P. Putnam's Sons, 1895.

This book was written for the use of the visitors of the State Charities Aid Association of New York, and contains information as to hospital buildings, ventilation, drainage and heating, nursing, the care of the insane, maternity wards, disinfection, and village hospitals. It is therefore a valuable manual to persons who are interested in the managements of hospitals or other charitable institutions, and may be read with advantage by architects and other persons who have to deal with the hygienic arrangements of buildings. In the appendix, interesting material is given as to the outfit for wards of twenty beds, of how to wash woolens, how to make various kinds of soap, the general rules which should govern hospital attendants, nurses, and patients, and finally the methods which should be employed in disinfection.

AN AMERICAN TEXT-BOOK OF SURGERY, FOR PRACTITIONERS AND STUDENTS. By Charles H. Burnett, Phineas S. Conner, Frederic S. Dennis, William W. Keen, Charles B. Nancrede, Roswell Park, Lewis S. Pilcher, Nicholas Senn, Francis J. Shepherd, Lewis A. Stimson, William Thomson, J. Collins Warren, and J. William White. Edited by William W. Keen, M.D., LL.D., and J. William White, M.D., Ph.D. Second edition, carefully revised.
Philadelphia: W. B. Saunders, 1895.

It is with pleasure we note that a second edition of this admirable text book has been required in little more than three years from the appearance of the first edition. This shows with what favor a truly serviceable work is received by the profession, and is in itself an endorsement more convincing than any words of praise that may be said by reviewers. It may be stated that the only changes are those necessitated by trifling errors and omissions and by the necessity for bringing the teaching thoroughly up to the most advanced knowledge of the day. This has necessitated in some cases considerable enlargement. Thus the effect of modern small arms in military surgery, many improvements and modifications of surgical technique, and some quite new operations, have required space. It is worthy of note that nearly everything of value which has been contributed in recent years to the general knowledge of surgery will be found in this volume. As a wise departure from the more common method it will be observed that each illustration that is not original is credited to its author immediately under the

cut, instead of the credit being given in the list of illustrations. There are a number of new and very admirable illustrations in this edition.

As a general criticism it may be said that this work better fills the requirements of a text-book of surgery for practitioners and students than any other published in the English language.

Correspondence.

LONDON LETTER.

By St. Clair Thomson, M.D., F.R.C.S. Eng., M.R.C.P. Lond.

When should we use the adjective "tuberculous," and when "tubercular"? Do they designate the same condition — are they synonymous and therefore interchangeable? The confusion in the employment of these two terms originates, of course, from the fact that "tubercle" has come to mean something more definite and specific than the condition to which it was originally applied. Originally it was used to designate a small knob; it is still used entirely in this sense in osteology; and in the adjectival sense "tubercular" designates a part studded with small projections or tubercles. But tubercle, a term originally applied simply to a coarse morphological condition, has been retained ever since we came to learn that it connoted nodular masses of cells formed around colonies of a specific bacillus. Now the authority of the *Lancet* and the *Medical Press* both lay it down that "tubercular" is the adjective of the original anatomical or morphological sense in which the noun was used, and should always be employed with much the same meaning as is given to it in anatomical text-books; when used in a pathological sense the proper adjective is "tuberculous," which denotes the various changes produced by the *Bacillus tuberculosis*. In support of the view that "tuberculous" is the correct term to indicate the specific infection, the *Lancet* points out that it is the term commonly employed in the pathological writings of our French and German colleagues. Now many writers employ both terms indifferently, and in so far as they are indiscriminate in the use of them they are undoubtedly wrong. But again there can be little doubt that the adjective "tubercular" is employed by a large number of writers, if not by the majority, in cases where the purists would have us use "tuberculous." I doubt if many authors speak of "tuberculous laryngitis or osteitis." Dr. Huggard, the well known British physician resident in the Alpine station of Davos Platz, points out that the termination "ous" means "full of" or "abounding in;" the termination "ar" means pertaining to. This distinction is illustrated in "populous" and "popular." The tendency, however, is for the termination "ar" to supplant its rival. If indiscriminately used, the termination "ous," with its definite meaning, would often be wrong, while the less definite "ar" would nearly always be right. Until this point is settled by philologists, writers will do wisely to adopt "tubercular" to the exclusion of "tuberculous."

Dr. Haffkine, a Russian pupil of Pasteur's, has been giving a lecture in London on his work in India, where he spent twenty-nine months carrying out a series of preventive inoculations against cholera. His system is based on the employment of a modified virus or vaccine, and is therefore analogous to Pasteur's work with regard to rabies, or Jenner's method for smallpox. It is not a "variolization"—which is simply the inoculation of the poisonous material direct from a patient affected with the disease. This latter was the plan tried by Dr. Ferran, in Spain, in 1885, with such disastrous results that its continuance was forbidden by the authorities. It was, if I mistake not, "variolization" which was introduced from the East by Lady Mary Wortley Montagu as a protection against smallpox, and which was the forerunner of Jenner's modified virus. It is well to bear in mind, as the number of these animal extracts increases, that Haffkine's method does not come under the heading of serum-therapy. Treatment by antitoxins cannot be used as a preventive treatment, as their effects on the system are rapidly worn out. However, with regard to the trial of the anti-cholera serum, Dr. Haffkine intends putting it to the test during his forthcoming visit to India. With reference to what he has done with the preventive inoculation, he expresses himself as quite satisfied with it, and quotes the following opinion of Koch himself: "The demonstration is complete; the protective power of the method is established finally by the observations collected in India up to now; further perfection and simplification may be possible, but the main question at issue, the chief part of the problem, is solved by the facts recorded in your report to the Government of India."

The debate at the Royal Medico-Chirurgi-

cal Society on "The Possibilities as to the Latency of Parasitic Germs or Specific Poisons in Animal Tissues," suffered somewhat from two defects. One was the inordinate length of the remarks of some of the four Fellows who introduced the subject, and the other was a certain want of clearness as to the meaning of the term "latency." This latter want of clear and limited definition allowed the discussion to wander too far afield, many of the speeches being taken up with pointing out the difference between latency and incubation, or between latency and arrest; while further indefiniteness was given by the division of latency into "real" and "apparent," and by the suggestion that the disease might be latent while the germs were active. Still, many interesting and suggestive points were brought out. Clinically it was pointed out that injury, cold, puberty, etc., seemed to bring the latent germs into action. Sir William Broadbent remarked that influenza had in the last five years so frequently ushered in typhoid fever that it seemed probable that the typhoid germ, being latent in the body, had been able to multiply when the resistance of the host was impaired by influenza. Another speaker remarked that the causes of latency were various even for the same micro-organism; the malarial germ was not killed, but rendered latent, by quinine; similarly, improved health and vitality of the host rendered the malarial organism latent for the time. The same was true of fungi, as was shown by a form of itch in the scrotum, due to fungi which remained latent in the cold season and became active in warm weather. Similar instances were referred to from the experience of the laboratory. The demand of the diphtheria bacillus for an alkaline pabulum is well known, and the conditions of latency and growth of various organisms need not be referred to. It would seem that the wave of interest which has passed from the bacilli to their toxins, and thence to their antitoxins, would now pass on to the study of the why and the wherefore of the conditions of latency both in the test-tube and in disease. The length of time which pathogenic organisms may remain latent in the human body has been definitely shown by some observations of MM. Le Gendre and Pochon (Société Médicale des Hôpitaux). For fifteen months they have kept under observation a child who has had three attacks of diphtheria in less than three years. During these fifteen months the Klebs-Loeffler bacillus has been looked for thirteen times, and on each occasion it has been found. When copious nasal douches of an antiseptic are given, the bacillus disappears completely or partially, but when discontinued the child suffers from malaise, and on examining the nasal mucus the micro-organism is again detected. It is evident that this is a well recorded instance of latency both in the germ and the disease. It is well worthy of note that of the three attacks of diphtheria the nose was affected on two occasions, and the greater persistence of the germ in the nasal cavity shows what shelter this cavity in unhealthy conditions may afford to germs. It bears out, also, the clinical experience of the greater gravity of diphtheria when affecting the nasal fossæ. It would be of much interest in this case to know if the child suffered from nasal obstruction, or any affection—other than the diphtheria—of the naso-pharynx.

A recent debate at the Pathological Society shows the confusion which still exists with regard to the diphtheria bacillus. A paper was read embodying a large amount of work, and concluding by the classification of this micro-organism into four varieties. 1. The long Klebs-Loeffler bacillus: pathogenic for guinea-pigs, and found in severe cases of diphtheria. 2. Short diphtheria bacillus (described in detail for the first time): pathogenic for guinea-pigs, but soon losing this character; associated with mild cases of diphtheria. 3. The short pseudo-diphtheria bacillus: never pathogenic to guinea-pigs; widespread and found in many cases of tonsillitis, catarrhal conditions, etc.; affections with this bacillus *per se* were never fatal. 4. Bacilli resembling the long Klebs-Loeffler, except for slight clubbing and more definite segmentation: non-pathogenic to guinea-pigs; caused no apparent hurt and were possibly non-pathogenic forms of the long Klebs-Loeffler bacillus. In the discussion which followed it was argued that length or clubbing of the bacilli gave no evidence as to virulence. While one speaker held that the only proof of virulence was to be obtained by seeing the effect of animal inoculation, another held that this was no guarantee and quoted in support Koch's experiments with cholera bacilli. Others pointed out that several of the varieties were found in a single case, more especially if several cultures were made; and while all seemed agreed that the term "pseudo-diphtheria bacillus" should be abandoned, many were of opinion that a case should always be reported as diphtheria even when this organism only was found.

A recent magisterial decision raises the hope that England may not continue to be the happy hunting-ground it has proved for quacks of all descriptions. An individual styling himself "M.D., U.S.A." has been fined one hundred dollars, and fifty dollars costs, for practicing without a proper diploma. At first there was some difficulty in getting the magistrate to grant a summons, as that legal worthy held that there was no evidence to show that the man was not what he represented himself to be. It is noteworthy that this case was carried through by a body of medical men, the Medical Defense Union. In any other European country the protection of the public devolves upon the State. However, a "precedent" has been created, and in law that would appear to be a mighty factor.

The Relations of our Profession with the Public was the subject of an address given by Dr. Burney Yeo to a students' medical society, and republished by him in last month's *Nineteenth Century* under the title of "Medicine and Society." It will be found to contain many interesting anecdotes told in an easy style, but it has raised a good deal of criticism as to the truth or wisdom of suggesting that society is beginning to "resent the increased costliness of medical and surgical help." Such a statement in a lay journal, it is pointed out, is apt to be applied in a general sense to encourage the ingratitude of the public. As a matter of fact, such a charge as is implied in the above quotation can only refer to the "guinea-pigs" amongst us, who are certainly no more numerous than in any other walk of life. Again, on the vexed question of "medical etiquette" Dr. Yeo suggests that we are almost too rigorous with regard to publicity in the general press, while we permit the "intra-professional advertising" under the cover of the writing of articles and books. With the Bar the opposite holds good: the names of barristers are frequently appearing in the daily press, but, although this form of advertisement is allowed them, any direct attempt to bring themselves to the notice of solicitors—a performance which is colloquially referred to as "cuddling the solicitor"—is regarded as an unprofessional proceeding. The *British Medical Journal* denies the parallel, and at the same time points out that the writing of a book for the edification of the solicitor is almost invariable amongst men who would rise at the Bar.

That Keats was a qualified member of our profession is definitely proved by Dr. Wilks in the *Guy's Hospital Gazette* of November 9. It is well known that one of the reasons for the poet's abandonment of the practice of the profession was his lack of nerve for surgery; but he himself gives as another objection: "I know that I could not take the fee!" This feeling is not so uncommon, especially amongst young beginners, as some scoffers would have us believe. Fortunately this repugnance is generally quite overcome by habit. It is hoped that Guy's Hospital will not neglect to honor so famous an alumnus, or—as in so many other cases in this country—it may be left to some American admirer of the poet to put up a tablet to his memory.

While on the subject of memorials I would refer to the movement to commemorate Professor Huxley, that staunch defender of truth, justice, and mercy, who declared that the only remedy he believed in for the physical and moral sufferings of the world was "veracity of thought and action." Politics, literature, science and art were all represented at a recent meeting of the general committee when an Oxford don declared that Huxley's prose took rank with the best and purest of English literature. It has been decided that the memorial shall take the form of (1) a statue to be placed in the Natural History Museum, beside those of Darwin and Owen; (2) a medal in connection with the Royal College of Science; and that (3) the surplus shall be devoted to the furtherance of biological science—*i. e.*, probably, by the establishment of scholarships. Subscription lists are to be opened on the Continent and in the States. At his own request the following lines by his wife have been placed over Huxley's grave:

> "And if there be no meeting past the grave,
> If all is darkness, silence, yet 'tis best.
> Be not afraid, ye waiting hearts that weep,
> For God still giveth his beloved sleep,
> And if an endless sleep He wills—so best."

PARIS.

For the last two months and over, as happens every year, the world of medical students in Paris has been excited over the competitive examinations for the places of hospital externe and interne. Not that the examination for externe is very important; it consists in speaking for five minutes, after five minutes' reflection, on a subject in anatomy (such as, upper third of femur, inferior maxillary, or relations of heart), and five minutes' further

speech on a subject in medicine or surgery (symptoms and diagnosis of acute lobar pneumonia, enteric fever, erysipelas, or venesection).

This year 307 externes were received, being named for three years, during which time they will be obliged to act under some physician or surgeon of the hospitals, taking notes, dressing wounds, or doing any work not considered important enough to call for the intervention of the interne or the physician or surgeon himself.

The internate is a more serious affair. In a certain way it corresponds to the position of house physician or house surgeon in an English hospital, but with the important difference that no qualified man is allowed to assume the post. Taking a degree implies resignation. All externes, except those just entering upon their functions, are obliged to compete for the internate, under pain of losing the appointment of externe.

The candidates, who for many days have been preparing themselves, assemble in a large hall at the Hôtel de Ville, where a jury composed of physicians and surgeons belonging to the hospitals, having made out a list of three subjects, draws one by lot, which is to be the subject of an essay to be written during the next two hours, no books or references being allowed. Such subjects are given as: "Describe the mucous membrane of the uterus;" "Give the differential diagnosis of various forms of uterine hemorrhage;" "The diaphragm;" "The symptoms and diagnosis of Pott's disease of the dorso-lumbar region." Usually a certain number leave without handing in any paper, having found the subject too difficult, or fearing to show their ignorance. Thus, this year, of 550 who entered, but 290 completed and handed in their papers. A day or two later, ten are drawn by lot, and read the anatomical portion of their essays before half of the jury, the medical or surgical portion being reserved for the other half of the jury. When this is over, a certain number—this year 150 out of the 290—are declared admissible, and by a second (oral) examination, in which they speak for ten minutes on two subjects chosen in the same way, some fifty or sixty are finally named as internes in accordance with the sum of the marks they have obtained in the written and oral parts of the examination. The next forty or fifty men after them are appointed provisory internes, and take the place of any interne who may be temporarily absent or give up his post; but these latter are appointed but for one year, while the former have a four years' appointment. Internes of the Paris hospitals reside in the hospital, accompany their superior physician or surgeon on his morning visits to the patients, and in the afternoon make a second round of visits alone. They likewise receive and treat any emergency cases, sending if necessary for additional help.

It is to be noted that, everything being so centralized in this country, one may be sure to find among the first dozen or so of internes of any year one or two or even more who will later on occupy the various positions in the official medical world; and it can well be said that the medical student who does not pass through the internate will find further promotion almost absolutely barred. Now and then, but only now and then, is an exception found, as in the case of Dr. Roux, whose work in bacteriology is so well known, and who was neither externe nor interne, nor ever held any official appointment either in the hospitals of Paris or in the Faculty of Medicine.

The number of students at the Faculty of Paris continues to increase. Thus, whereas at the end of the year 1893–4 there were 4547 students for the Doctorate and 527 for the Officiat de Santé (now abolished), on the 1st of October 1895 there were 4897 for the Doctorate and 342 for the Officiat—an increase of 350 for the Doctorate, and 85 less for the Officiat. This increase is due to three causes: first, every year more candidates undertake the study of medicine; second, a greater proportion now come to Paris than formerly, leaving the provincial schools, where they formerly were in the habit of spending their first two or three years; and third, the increase in the number of foreigners who enter here. The latter were but about three hundred ten years ago, and now number over a thousand. They come principally from Russia, Servia, Bulgaria, Roumania, and from some of the South American countries. Their presence has lately excited much hostile feeling among the French students, and even among men of higher rank, who felt that when the Faculty of Medicine was so overcrowded their own countrymen should have the first chance. This year, accordingly, by decision of the authorities at the Ministry of Education, all foreigners applying for permission to study medicine in France have been informed that it can be granted only for those entering the provincial faculties and schools. This measure is likely to lead

to a considerable falling off in the number of students coming from abroad. In reality, did they but know it, nothing could be better for foreigners themselves than to study in the provinces, where the number of students is much less, in some cases amounting to but thirty or forty, with from ten to twelve instructors. It is to be noted, too, that the men who come up to Paris after two or three years in one of the provincial schools are better grounded in their work, and succeed better, than those who from the beginning have studied in Paris.

Dr. Albert Robin, whose works on physiological therapeutics are well known, especially on the treatment of enteric fever, has for some time been studying in his wards of the Hôpital de la Pitié the therapeutic uses of glycero-phosphates. He was led to do this by noting the excessive phosphaturia in organic combinations which took place in some forms of nervous disorders, and which he attributed to an excessive katabolism of lecithin.

By a series of experiments he was led to attribute to glycero-phosphates the following physiological actions:

1. Metabolism, both of organic and inorganic matter, is accelerated.

2. Nitrogenous exchanges are hastened, both as to assimilation and disassimilation.

3. Uric acid is relatively diminished.

4. Sulphur compounds are acted upon similarly to nitrogenous ones, and, the ratio of sulphur to nitrogen increasing in almost every case, it is to be concluded that organs rich in sulphur, like the liver, are especially the seat of more vigorous nutrition.

5. Intestinal fermentations are but little affected.

6. The increase in chloride of sodium excreted is a proof of increased appetite, a fact clinically confirmed.

7. There is relative diminution in the disassimilation of phosphorus, and absolute in that of magnesium, both substances belonging pre-eminently to the nervous system.

8. Calcium exchanges are increased, and in this way there is acceleration in the nutrition of the osseous system.

From the physiological conclusions above, Dr. Robin is led to think that glycero-phosphates are not to be employed against this or that particular disease, but against varied morbid elements which indicate the use of the preparation. Thus, in a patient suffering from neurasthenia, with phenomena of excitement and exaggeration of nitrogenous metabolism, glycero-phosphatic medication is contra-indicated. The same treatment would be useful in such a patient with elimination of phosphates greater than that of urea.

Dr. Robin divides the therapeutic indications of glycero-phosphates into four groups:

1. Lowering of nitrogenous exchanges, both in assimilation and disassimilation, as in their oxidation,—comprising: (*a*) one form of chlorosis, with diminution of oxidations, where glycero-phosphates of iron, soda and potash are efficacious; (*b*) chronic gout, in cachectic condition (acute gout is a contra-indication); (*c*) diabetes with cachexia (the same contra-indication as above in florid diabetes); (*d*) obesity with diminished oxidations; (*e*) chronic tuberculosis, with the double object of stimulating the organism and of diminishing the demineralization of the cell, a process which Dr. Robin looks upon as one of the adjuvant causes of the disease; (*f*) chronic Bright's disease, with albuminuria and little urea; (*g*) phosphaturic albuminuria; (*h*) dyspepsia with diminished acidity and gastric insufficiency, after appropriate gastric treatment; (*i*) in those advanced in years suffering from general debility.

2. Cases with insufficient hepatic action, carefully excluding all cases with exaggeration of hepatic processes.

3. The most important group comprises any depraved state of the nervous system, such as: (*a*) convalescence from acute affections, influenza; (*b*) various forms of phosphaturia, with the exception of phosphaturia secondary to hypersthenic dyspepsia with hyperacidity; (*c*) many forms of neurasthenia, where depression or asthenia is the leading symptom,—but phenomena due to excitement are aggravated; (*d*) muscular atrophies of various origins; (*e*) paralysis due to various causes—in this class the medicament has but little influence; (*f*) the lightning pains of tabes dorsalis, tic douloureux, sciatica, lumbago—which are particularly benefited by this treatment, the pains of tabes in seven out of ten patients being either much modified or altogether abolished; (*g*) Addison's disease. In mental diseases or progressive general paralysis no good effect has been observed—in fact, the results have been harmful in agitated patients; but some good effect has been noted in depressed patients suffering from melancholia.

4. Whenever it is desirable to modify the metabolism of the calcium salts, as in many affections of the bones, such as rickets, osteomalacia, fractures, etc.

Dr. Robin administers glycero-phosphates

of lime, iron, soda, magnesia, and potash, either by hypodermic injection or by the mouth. For hypodermic injections he employs from one to ten cubic centimeters, ordinarily one to four, of solutions of glycero-phosphates of lime, soda, or magnesia—the first being a five-per-cent. solution, the second a twenty-per-cent. solution, so that each dose corresponds to from five to fifty centigrammes of glycero-phosphates of lime, and from twenty centigrammes to one gramme (20–100) of glycero-phosphate of soda. The solutions are an exceedingly good culture medium, and should accordingly be prepared and preserved with great precautions.

Dr. Robin informed me personally that he has had for some time under observation a synthetic preparation, the fabrication of which requires three weeks. It would seem to present some advantages over solutions prepared in the customary manner. Dr. Robin will shortly present a communication to the Academy of Medicine, in which he will give a full account of mode of preparation.

If glycero-phosphates are to be administered by the stomach, the doses should be from thirty centigrammes to one gramme of lime, soda, potash, or magnesia salts, administered daily towards middle of repast; and for the iron preparation from ten to twenty centigrammes daily. The following prescriptions are recommended by Dr. Robin:

Syrup.

℞ Glycero-phosphate of lime, 6 Gm.;
Glycero-phosphate of soda,
Glycero-phosphate of potash,
Glycero-phosphate of magnesia, of each 2 Gm.;
Glycero-phosphate of iron, 1 Gm.;
Tincture of St. Ignatius bean, 30 drops;
Pepsin, 3 Gm.;
Malt, 1 Gm.;
Tincture of kola, 10 Gm.;
Syrup of cherries, to make 200 Gm.

A soupspoonful at lunch and dinner, during repast.

As the above syrup is somewhat difficult to prepare, Dr. Robin often recommends the following wafers:

℞ Glycero-phosphate of lime, 0.30 Gm.;
Glycero-phosphate of soda,
Glycero-phosphate of potash,
Glycero-phosphate of magnesia, of each 0.10 Gm.;
Glycero-phosphate of iron, 0.05 Gm.;
Powdered St. Ignatius bean, 0.03 Gm.;
Pepsin, 0.15 Gm.;
Malt, 0.15 Gm.

For one wafer. ¡Two daily, at lunch and dinner, during the repast.

For cases where it is desirable to administer iron, the pilular form is to be preferred:

℞ Glycero-phosphate of iron, 0.05–0.10 Gm.;
Powdered rhubarb, 0.05 Gm.;
Extract of cinchona, 0.15 Gm.

The above doses are to be looked upon as medium ones; excitability or insomnia in the patient is a warning to cease the treatment for a few days, and to begin again with doses reduced one-half.

Whenever economy is especially desired, glycero-phosphate of lime may be administered by itself in wafers, at doses expressed above.

Public excitement over the serum treatment of diphtheria has entirely disappeared, and it may be said to be taken as a matter of course. Here and there in the window of some chemist may be seen a notice announcing that the anti-diphtheritic serum may be purchased within; but it attracts no attention, and has the appearance of always having been there.

The Alberto Levi prize, of 50,000 francs ($10,000), has been divided between Professor Behring, of Marburg, and Dr. Roux, of Paris.

One result of the serum treatment is that more attention has been paid to intubation of the larynx in France than has been the case in previous years; and tracheotomy, which had more than held its ground, is rapidly becoming less frequent.

What the public is now becoming interested in is the anti-streptococcic serum prepared by Dr. Marmorek at the Pasteur Institute. Dr. Chantemesse, of Paris, has been employing it to treat patients suffering from erysipelas. While the treatment of 554 patients by other methods gave a mortality of 3.79 per cent., the mortality under the serum treatment in a series of 501 patients was only 2.59 per cent. A powerful serum administered in small doses is surer than a weak serum administered in large doses. The local, and especially the general, condition of patients was favorably affected. From twenty to forty cubic centimeters was the usual dose. Some surgeons have been using the serum before operating, especially on cases of salpingitis, thus limiting the abscess and preventing its rupture into the abdomen.

A. T. TURNER, M.D. (Paris).

Notes and Queries.

THE FIRST OPERATION UNDER ETHER IN ENGLAND.

In an excellent editorial on Sir Edwin Arnold's address to the students at St. Thomas's Hospital, the *Lancet* calls attention to the fact that the advance of our art which most appeals to him is the discovery of anes-

thetics. The spirit in which the discovery was welcomed in England is well illustrated by the account given by Sir Russell Reynolds, at the University College Hospital dinner in 1888, of the first operation performed in England under anesthesia:

"The first operation in this country performed under an anesthetic was witnessed in University College Hospital. Liston had consented to try the anesthetic. I can see him now as he said to the students: 'Gentlemen, we are going to try a Yankee dodge for making men insensible.' . . . At length Peter Squire said: 'He is quite ready now, sir.' Liston's knife flashed in the air; I took out my watch to count the time, and the leg was on the floor in six-and-twenty seconds. Liston turned to the students and said: 'This Yankee dodge, gentlemen, beats mesmerism hollow.'"

And the *Lancet* remarks: "That was all the welcome given to the first use of anesthetics in England. There was no public rejoicing, no Thanksgiving Day, no Te Deum in the churches, no commemoration of the discoverers; the great discovery had to make its way against obstinate prejudice and folly in high places, even in some of our profession; and Liston's somewhat grudging utterance should serve as a warning to those of us who make light of new methods only because they are new. We are glad that Sir Edwin Arnold saw only the discovery itself, and not the way in which it was received."—*Boston Medical and Surgical Journal*, Nov. 28, 1895.

THE RAY LANKESTER AND FRASER CONTROVERSY.

Prof. Ray Lankester is to the front again. With a great flourish of trumpets he steps into the arena and challenges Professor Fraser, of Edinburgh, to mortal combat on the question of priority in the discovery of the means of rendering animals immune against the venom of the cobra and other serpents. The two combatants are well matched, and are likely to render a good account of themselves.

Mr. Lankester was for some years professor of comparative anatomy at University College, London, and now occupies the honorable post of Linacre Professor of Comparative Anatomy in the University of Oxford. For a very short time, if we mistake not, he served in a somewhat similar capacity in the University of Edinburgh. He is a cool and wary antagonist, and a past-master in the art of controversy. He hits hard, and has a remarkable facility for saying very disagreeable things in very few words. His recent letters to the *Times*, dated from the Athenæum Club, were, if not convincing, at all events excellent models of special pleading.

Prof. T. R. Fraser's record is an equally distinguished one. He is not only Professor of Pharmacology and Therapeutics in the University of Edinburgh, but also Dean of the Medical Faculty. He is probably the most distinguished pharmacologist in Europe, and his elaborate and careful papers on the physiological action of Calabar bean and of strophanthus, not to mention his investigations on the "late tetanus" of atropine, will always remain models of original research. He is universally respected, and it is especially to his credit that, in spite of all temptations, he has refrained from writing a textbook of materia medica for students.

Curiously enough, Professor Lankester takes up the cudgels, not on his own behalf, but in defense of Professor Calmette, of Paris, for whom he claims priority in the discovery of the antitoxin of snake-poisoning. He opens cautiously, and evidently with a full appreciation of the fact that he has no mean adversary to contend with. He is at a disadvantage at the outset, for he is no pharmacologist, and is fighting on ground to which he is unaccustomed and on which with a little want of care he may sustain a nasty fall. He commences his onslaught by stating that he desires to make a simple statement without commenting on the facts, and then proceeds somewhat inconsequentially to assert in very positive terms that the whole credit of the discovery rests with Professor Calmette.

Dr. Fraser's reply, couched in simple and dignified language, must have taken him somewhat by surprise. He points out that no claim of priority has ever been advanced by him; that although his communications have been of the nature of preliminary statements, in which it is not customary to enter into the details of other people's work, he has done ample justice to Dr. Calmette, and that, so far from there being any antagonism between him and the French observer, he entertains the highest opinion of his researches.

It is to be presumed that Prof. Ray Lankester will have something more to say on the subject, but, so far, his efforts have not been attended with any marked success, and the honors of the first round certainly rest with his antagonist.—*Medical Press and Circular*, Dec. 18, 1895.

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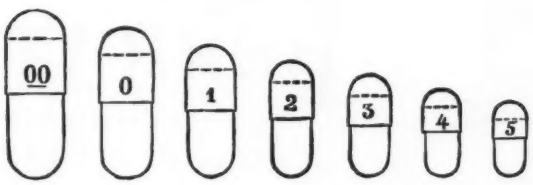

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